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SUMMARY OF RECENT ABSTRACTS *

III. MALARIA †

General

The report of the Malaria Institute of India (p. 415) covers the years 1948–50. The studies conducted at the Institute laid particular emphasis on antimalarial drugs, but also covered problems of transmission and evaluation of insecticides.

The First Asian Malaria Conference (p. 3) dealt with the general benefit to health and economics which has resulted from malaria control, and the need to evaluate the results, and to co-ordinate national programmes informally between the participating countries.

Epidemiology

Swellengrebel (p. 607) points out that malaria still occurs in Amsterdam, and discusses the possibility (not yet proved) that *Anopheles plumbeus* may be a vector.

In Azerbaidjan, malaria (mostly *P. vivax*) is feebly endemic, and the vectors are *A. maculipennis*, *A. superpictus* and *A. bifurcatus* (Trofimov and Lysenko, p. 867). An earlier survey (1941–47) by Bagramjan (p. 868) showed that although *P. vivax* was the commonest parasite in children, *P. falciparum* was predominant in other age-groups.

In recent years in Israel *A. sacharovi* (which was responsible for malaria with a peak in summer) and *A. superpictus* (peak in November) have largely disappeared, and Saliternik (p. 116) shows that malaria now occurs in October, carried by *A. sergenti* which is little affected by residual DDT and whose prevalence has increased with the development

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1955, v. 52. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

† For previous articles on malaria in this series see the March issues of the *Tropical Diseases Bulletin* each year since 1939.

of irrigation and fishponds. PRINGLE (p. 116) discusses the history of malaria in Iraq before 1946. In the north and north-east it was stable, occurring in summer epidemics carried by *A. maculipennis* and *A. superpictus*. In the west and south (the alluvial plains) it was very unstable, occurring in epidemics (possibly with a 10-year cycle related to river floods) carried by *A. stephensi* and *A. sacharovi*. Between the mountains and the plains it was stable, carried by *A. superpictus*. In those times the most effective method of control was the provision of a piped water supply in the *A. superpictus* areas.

MONTILLIER (p. 241) describes the malaria situation in an oasis in the Algerian Sahara, where breeding of *A. sergenti* in wells and irrigation channels has been controlled by means of DDT and *Gambusia*. Prophylactic chloroquine is given twice each month to the children.

An epidemic of malaria in the Isle of St. Vincent, Cape Verde, occurred after phenomenal rainfall in 1952, and was associated with high prevalence of *A. gambiae* in human habitations. DE MEIRA (p. 1161) reports that about one-sixth of the population were infected, mostly with *P. vivax*. JANZ (p. 4) shows that in São Tomé (Gulf of Guinea) the spleen rate in half-caste children both in the city and the outskirts (45·6 and 72·7 per cent.) was considerably higher than that of the African children in the same areas (30·5 and 30·2).

In Accra the general infant mortality rate is about 118 per 1,000 (the average of 5 years), 16·8 per 1,000 being due to malaria; at age 1–5 the figures are 30·8 and 10·0, respectively. COLBOURNE and EDINGTON (p. 115) relate the malaria deaths to the different zones of the town; they appear to indicate that malaria is a more important cause of death in childhood after infancy in the less malarial parts of the town—the authors think that the experience of malaria in infancy, when the rate is high, may lead to some immunity in later years.

CAMBOURNAC *et al.* (p. 1043) report a malaria survey of children in Angola, where spleen and parasite rates vary from under 10 per cent. to over 80 per cent. in different areas.

An account of the hyperendemic malaria of the Himalayan foothill area (the Terai) is given by CHAKRABARTI (p. 1162). *A. fluviatilis* is the principal vector, but there have been changes in the sporozoite rates, which have tended to fall, and there has also been some tendency to greater anthropophilism. The reasons for this are not clear, but may be related to control programmes and changes in the prevalence of cattle. Highly unstable malaria, with irregular epidemic incidence, is reported by SATYA PRAKASH (p. 605) from the state of Kutch, India.

In Malaya (p. 736) the general trend of the incidence of malaria appears to be favourable; control of urban malaria is good, but control of rural malaria is not so satisfactory as in some other neighbouring countries.

CHANG and WU (p. 1043) show that the death rate from malaria in Taiwan fell between 1915 and 1941, but rose under war conditions in

1942. The disease was most prevalent in rural areas at that time. In a hilly region of southern Taiwan Hsieh *et al.* (p. 1044) report spleen rates of over 80 per cent.; of the 6 species of *Anopheles* found, *A. maculatus* was the most common and *A. minimus* the greatest house-haunter in the daytime. Although there is not much transmission of malaria in the Pescadores Islands, breeding of *A. hyrcanus sinensis* does take place to some extent in the rainy season; Demos *et al.* (p. 1044) report spleen rates up to 15 per cent. in schoolchildren.

A malaria survey of the area of the Minj river in New Guinea showed intense infection in the broad Waghi valley where *A. farauti*, *A. punctulatus*, *A. annulipes* and *A. bancrofti* are found, though Black (p. 505) did not find them infected. Mackerras and Sandars (p. 506) report on malaria in the islands of the Torres Straits. *P. falciparum* malaria has been epidemic on some of the eastern and central islands, carried by *A. farauti*, and a few cases of *P. malariae* infection were found on another, but the western islands were almost free. *P. vivax* was not found on any. Other anophelines were found in the islands almost free of malaria, and the disease appears to be dying out.

Transmission

Horsfall (p. 497) has published a book on the bionomics of mosquitoes and their relation to disease. Much of it deals with anophelines and malaria.

Davidson (p. 121) has devised a method for estimating the survival rate of anophelines in nature, which depends on changes in the diameter of the ampulla of the oviduct due to ovarian development and oviposition. It is necessary to know the measurements for nulliparous and parous mosquitoes, and the gonotrophic cycle. The author has examined *A. gambiae* from this point of view. Kershaw *et al.* (p. 584) have shown that, as with *Aëdes aegypti*, the rate of mortality of several anophelines increases with increasing age.

Clyde and Shute (p. 434) describe a technique for the investigation of mosquito feeding preferences on man, which takes into account the leucocyte counts of blood from man and from mosquito gut.

Grjebine *et al.* (p. 119) have devised a test for blood in the stomach of a mosquito, which agglutinated in the presence of specific haemagglutinating serum. Its sensitivity is low, and the applicability limited. In comment Weitz emphasizes the superiority of the precipitin test.

Micks (p. 954) having previously found that the ciliate *Vorticella microstoma* had a lethal effect on larvae of *A. quadrimaculatus*, now reports a similar effect on *A. m. atroparvus*.

Laarman (p. 869) has published a long thesis on the host-seeking behaviour of *A. m. atroparvus*, in which he concludes that olfactory factors are important. The account should be read in full.

A study of the participation of the tracheal system in the evaporation

of water in *A. m. messeae* is reported by VINOGRADSKAYA (p. 1163); details are given in the original abstract.

D'ALESSANDRO (p. 953) describes a mountain habitat of *A. m. labranchiae* at an altitude of 1,270–1,847 metres in Italy, where it lives independently of man. The domestic and anthropophilic characters of this species are a secondary adaptation. A survey of Sicily, where residual DDT has been used for some years, and which formerly was highly malarious, revealed that in 1953 malaria had been reduced to insignificant proportions. D'ALESSANDRO *et al.* (p. 604), however, found reduced, but still considerable, breeding of anophelines—*A. m. labranchiae*, *A. claviger* and *A. superpictus*; *A. m. labranchiae* has acquired an extra-domiciliary form of life which would make eradication difficult. It is stated that eradication is not essential for the control of malaria as long as the spraying programme is continued; there is no sign of resistance to the insecticides. MARIANI and CEFALU (p. 953) show that in Sicily in winter, female *A. m. labranchiae* shelter in small slits and holes in rocks; blood can be found in the gut of these females, and the ovaries are in various stages of development.

GUELMINO *et al.* (p. 608) give an account of the anophelines of Serbia, which include the *A. maculipennis* group, *A. claviger*, *A. superpictus*, *A. plumbeus* and *A. hyrcanus*. VOUKASSOVITCH and GLADILIN (p. 1163) studied *A. m. maculipennis* and *A. m. messeae* in parts of Yugoslavia, noting variations in the coloration of the eggs which lead them to suggest that there may be a cross-relationship between these two varieties. *A. superpictus* was found in one area.

In the Astrakhan state reserve BAGIROV (p. 954) found *A. m. messeae* in the nests of various birds; some contained avian blood.

A key for the identification of the anophelines of Iraq has been published by PRINGLE (p. 5). MERUCCI (p. 742) lists the species of *Anopheles* recorded in Yemen.

It has been stated that biological races of *A. gambiae* can be separated according to the maxillary index, but GILLIES (p. 5) has shown that this index varies according to the character of the breeding water and has not been proved to be related to host preference and resting habits.

The estimation of the amount of mosquito breeding from the incidence of larvae depends on systematic dipping. BELKIN (p. 119) describes a special system of sampling and computation. CHRISTIE (p. 120) describes a method for counting total larvae of *A. gambiae* in pools, which involves emptying the pools, catching the larvae in sieves of different mesh, and counting them. Water and larvae may be returned to the pools for further study, and this technique would permit the modification of selected constituents of the water. WILSON and MSANGI (p. 742) have used this technique as a measure of the efficiency of the ordinary dipping technique for detecting larvae; dipping must be regarded as unreliable, since there is a 3-to-1 chance of missing larvae. Where larvae are rare they may be missed altogether.

Smith (p. 608) has studied the resting places of *A. gambiae* and *A. funestus* in huts (which house cattle and goats besides man) on Ukara Island, Tanganyika. Both feed almost entirely on cattle and man, but in *A. gambiae* there is some change in choice between these according to season.

By taking account of the population density of *A. gambiae* and *A. funestus*, their biting frequency and infection rates, their mortality rates and the incubation period of parasites in them, Macdonald (p. 1047), on the basis of two malaria surveys by Davidson and Draper in Tanganyika and Uganda, has calculated the number of times each person is bitten each day and the basic reproduction rate of malaria. There seem to be factors which keep this rate down to just above the level below which malaria would tend to die out, and of these factors reduced infectivity of the mosquito seems to be the most important. The author thinks that the development of immunity and the consequent reduction of the gametocyte rate also tend to keep the reproduction rate of the disease at just above this critical level [but see Bishop, below]. Rapid changes in mosquito density and other factors can upset the reproduction rate, but in this part of Africa such changes do not upset the endemic level, which (in contrast to the plains of India) is remarkably stable.

Observations on *A. gambiae* and *A. funestus* in the Gold Coast led Muirhead-Thomson (p. 740) to the conclusion that infant gametocyte carriers (*P. falciparum*) are remarkably non-infective. In addition, the mosquitoes do not feed readily on infants, though in general their anthropophilic index is high. Older children and even adults are probably a greater source of infection than infants, and *A. gambiae* appears to pick up the malaria parasite more than twice as rapidly as *A. funestus*. Persons with very few gametocytes which would be missed if not searched for intensively, may be relatively good infectors.

An account of the anophelines of West Senegal is given by Hamon *et al.* (p. 1148), and of the French Cameroons by Adam (p. 1148). Lambrecht (p. 1048) provides notes on the anophelines of the Ruzizi Valley, Belgian Congo, where in February the salivary gland infection rate in *A. gambiae* was as high as 9·23 per cent.

Halcrow (p. 743) reports that *A. gambiae* in Mauritius (where residual insecticide was used from 1949 to 1952) tends to rest in cowsheds and feed there on cattle, but that a small amount of feeding on man takes place in the open.

Bhombore *et al.* (p. 245) discuss the seasonal prevalence of mosquitoes in Mysore, where *A. fluviatilis* is the principal vector. They point out that limiting factors of species distribution may apply to adults, and this in turn may influence the choice of larval habitats. Climate influences longevity and therefore vector potential. Larval collections do not necessarily give a reliable index of the numbers of adults, for the longevity of adults may be low, and this may be important in a vector species.

Anopheles annularis is widely distributed in the Far East, but is an

important vector of malaria only in the coastal region of Orissa. Venkat Rao (p. 328) summarizes the work done on breeding places, habits and control. He suggests that conditions in Orissa may be such that females require more than one blood meal for maturing eggs, and therefore they may remain in houses and cattlesheds long enough to show infections of the salivary glands. Elsewhere the females appear to be obliged to leave the shelters for oviposition after a single blood meal, and may therefore be short-lived.

In Ceylon Ariaratnam (p. 1164) observed that *A. culicifacies* was most commonly found in houses with walls of dried coconut leaves, and least in houses with lime-washed mud walls. Comparatively few were on furniture and hangings.

Rattan Lal (p. 955) shows that the optimum temperature range for the development of *A. subpictus* is 30°–35°C., and for *A. stephensi* 25°–34°C. In human dwellings and cattle sheds in villages near Lahore there are two peaks of anopheline density, one in spring and one in autumn; Ansari and Nasir (p. 1165) give an account of the species found, of which the most prevalent was *A. subpictus*, especially in the rainy season July–September. *A. stephensi* may be the vector in this area. Krishnan (p. 506) summarizes the biology of *A. stephensi*.

In papers on the malaria vectors of India an account of the *A. leucosphyrus* complex is given by Krishnamurthy (p. 955), and of *A. varuna* by Venkat Rao (p. 955).

In the coastal area of Djakarta *Anopheles sundaicus* has shown a marked degree of resistance to DDT; Crandell (p. 329) states that this did not involve resistance to dieldrin, which is to be used there in place of DDT.

Tseng and Hsieh (p. 743) report that the principal vector in Taiwan is *A. minimus*, but that occasional infections can be found in *A. tessellatus* and *A. hyrcanus sinensis*.

The blood sources of some Australian mosquitoes, including *A. annulipes*, have been investigated by Lee *et al.* (p. 215). *A. annulipes* feeds mainly on mammals, but also to a considerable extent on domestic fowls. Pictorial keys to the mosquitoes of medical importance in the Australian region have been published by Cook and Foote (p. 937).

Jones (p. 329) has published observations on the behaviour of fourth instar *A. quadrimaculatus*. Wallis (p. 486) has made a laboratory study of the ability of certain mosquitoes to distinguish between fresh water and waters of varying saline content. Three anophelines, *A. quadrimaculatus*, *A. freeborni* and *A. aztecus* laid eggs in solutions of concentrations up to 4 per cent. In experimental work the same author (p. 1049) showed that *A. quadrimaculatus* deposited 88 per cent. of its eggs while in flight (against 8 and 1 per cent., respectively, for *A. freeborni* and *A. aztecus*). This tendency is an important factor in the dispersal of eggs over an area beyond that selected by the flying female.

An account of the effects of variations in reservoir levels, rainfall and temperature on the densities of *A. quadrimaculatus* and *A. crucians* in a reservoir in South Carolina is given by ATCHLEY *et al.* (p. 1049).

Hybridization experiments by BARR (p. 329) indicate that *A. aztecus* and *A. freeborni* are more closely related to each other than either is to *A. quadrimaculatus*, and that the differences between all three are large enough to allow them to be regarded as specifically distinct.

The Report of the Malaria Division, Trinidad and Tobago, for 1953 (p. 242) shows a continuing fall in the incidence of the disease. *A. aquasalis* is a principal vector, breeding in rice fields and fish ponds and other waters, but observations indicate that larvae in damp ground do not usually survive for more than 14 days, *i.e.*, half the lunar cycle, which must restrict breeding in coastal mangroves. *A. bellator* is present, and control continues by spraying with copper sulphate the bromeliads in which it breeds. Residual insecticide spraying of coastal and malarious areas is carried out.

In a survey of forest mosquitoes in the Panama area TRAPIDO *et al.* (p. 1075) found that the anophelines in general remained almost entirely at ground level except *A.* (*Kerteszia*) *neivai*, which breeds in epiphytes in the tree tops and is often captured there.

In 1951, after several years of absence from the coastlands of British Guiana as a result of the campaign of eradication through insecticides, *A. darlingi* reappeared in a new drainage-irrigation scheme. GIGLIOLI and CHARLES (p. 6) show that the invasion was quickly stopped by an emergency programme of residual spraying of houses in the affected area in addition to the routine policy of spraying barrier zones.

In a study of the breeding waters of *A. tarsimaculatus* in part of Brazil DE ANDRADE (p. 6) shows that it has a markedly higher tolerance than *A. argyritarsis* for acidity.

Aetiology

In a discussion of the genesis of gametocytes in plasmodia, BISHOP (p. 1045) makes the points that the number of gametocytes is influenced by the method of transmission (tending to fall on continued blood-transmission); that formation of gametocytes apparently does not depend on the state of immunity of the host; that gametocyte density is correlated with infectivity for mosquitoes, though an important (and unknown) factor of quality is also involved [see MUIRHEAD-THOMSON, above]; that pamaquin and primaquine inhibit the development of gametocytes; but that proguanil does not prevent the formation of oöcysts but inhibits further development.

SHUTE and MARYON (p. 244) analyse the behaviour of strains of malaria parasites used in malaria therapy at the Horton Hospital, England. The Madagascar strain of *P. vivax* showed a shorter incubation period than strains from Rumania and French Cameroons; patients with the Madagascar strain developed homologous immunity, but remained slightly

susceptible to the Cameroons strain. All strains infected English *A. maculipennis atroparvus*, but to different degrees. European strains of *P. falciparum* produced more severe infections than African strains, and required more quinine for control. *A. m. atroparvus* was refractory to African and Indian strains, but *A. stephensi* was readily infected with African and European strains. *P. ovale* and *P. malariae* from various areas behaved uniformly.

In tests with strains of *P. vivax* from America and from other countries, *A. quadrimaculatus* showed a high degree of susceptibility; Jeffery *et al.* (p. 122) comment that this mosquito could transmit strains from Korea in America.

Garnham *et al.* (p. 1046) have, for the first time, identified the pre-erythrocytic stage of *P. ovale*, which, when mature, gives rise to some 15,000 merozoites of characteristic structure, being large (1·8 μ) spherical bodies with the nucleus at one pole. The length of the pre-erythrocytic cycle is 9 days. Relapses occur, which indicate persistence of exo-erythrocytic schizogony after invasion of the blood. The authors experimented on themselves, and they point out that this infection is by no means the mild affair it has been claimed to be. One characteristic is the production of double the number of merozoites (12–16) by the schizonts during relapses. Jeffery *et al.* (p. 117) give an account of the Donaldson strain of malaria parasite, which was finally established as a strain of *Plasmodium ovale*. The prepatent period was found to be 12–20 days, paroxysms were usually mild and few, and relapses were rare. An account is given of the morphology of the parasite, and of its transmission by various anophelines. The strain showed only a low degree of infectivity. This is probably the first record of *P. ovale* indigenous to the United States. The same authors (p. 869) have made a comparison of a West African and a West Pacific strain of *P. ovale*; in general the resemblances were close, and patients who had been infected with the first strains showed considerable immunity to the second, but little to the Chesson strain of *P. vivax*.

Sinton (p. 868) thinks that the distortion of the erythrocytes characteristic of *P. ovale* is an artificial feature produced by pressure on the coverslip; but it is nevertheless a feature of great diagnostic value.

A few cases of *P. ovale* malaria are reported by Masseguin and Palinacci (p. 1163) in the Upper Volta region of French West Africa, where *P. falciparum* is by far the most common parasite.

Pathology: Clinical Findings

Edington (p. 330) reports autopsies in cerebral malaria in children in Accra, paying attention to pigment in the Kupffer cells and the scarcity of iron-containing pigment in the liver and spleen. The patients had been treated before death, and the author makes the point that a negative blood slide does not exclude a diagnosis of cerebral malaria.

White and Doerner (p. 330) report functional and biopsy tests of the liver in malaria, which indicated involvement of the reticulo-endothelial system; there was no evidence of chronic hepatitis after malaria. In the South-West Pacific and in New Guinea Black (p. 606 *bis*) finds epidemiological evidence which suggests that one form of enlargement of the liver is due to malaria. A schedule for recording enlargement of the liver according to 5 degrees is suggested by Jaswant Singh (p. 736).

Malaria parasites were found by Hentsch (p. 1166) in over 9 per cent. of 1,023 new-born infants in part of Java where the maternal infection rate was over 90 per cent. Dimson (p. 331) reports a case of congenital malaria in an infant born in England, in which the diagnosis was not made for several days. In comment Woodruff emphasizes the importance of enquiry into the movements of patients when case-histories are taken, and of treating cases of tropical illness in a centre equipped and staffed for the purpose.

Discussing the diagnosis of malaria in Europeans repatriated from malarious areas, Benazet *et al.* (p. 744) conclude that short of the demonstration of parasites in the blood, or in liver biopsy, there are no certain signs of malaria. Previous residence in a malarious country can be regarded as presumptive evidence, especially if the spleen is enlarged; serological reactions become negative soon after the attack.

In Formosa Ch'en *et al.* (p. 606) found that by examining children in the recumbent position on the right side with knees flexed and the left arm extended a higher spleen rate was obtained than by examining in the supine position. This gave a truer picture of the incidence of malaria.

The prepatent period of inoculation malaria (some 3·4 to 3·8 days) is hardly affected by differences in blood groups between donors and recipients except when O recipients received A blood. Myatt *et al.* (p. 609) show that in that case the mean period is extended to 11·3 days. The experience of Young *et al.* (p. 1165) with therapeutic malaria indicates that American Negroes possess natural resistance to the St. Elizabeth, Chesson (and other Pacific strains), Korean and Mediterranean strains of *P. vivax*. In comment Garnham suggests that it would be interesting to test them with East African strains, since in East Africa there are foyers where this parasite is quite common in the Africans.

Hall (p. 744) reviews the history, clinical features and treatment of 111 attacks of Korean *P. vivax* malaria. In a study of a Korean strain of *P. vivax* in volunteers, Arnold *et al.* (p. 246) show that long-term relapses tend to occur, that the season of the year has little direct effect on the relapse pattern, that the occurrence of an early or late primary attack is not dependent on the intensity of infection, and that the disease terminates spontaneously about 18 months after infection. In comment Covell points out that strains with similar characters are not confined to temperate zones, they have also been observed in tropical zones.

Jaswant Singh and Ramakrishnan (p. 743) believe that relapse in malaria may be precipitated by the evolution of parasites which have become resistant to the immunity acquired by the host. The discussion of the subject should be read in full.

Some circumstantial evidence that relapsing fever may to some extent protect against malaria is produced by Sicart (p. 49), who studied the question in Tunisia.

A comprehensive review of the literature on spontaneous rupture of the spleen has been written by Covell (p. 705), who shows that malaria is by far the most common cause, and that most cases occur in the primary attacks in non-immune subjects. Many cases have been observed at autopsy without previous diagnosis, and the condition is probably therefore more common than we suspect. It appears to be commoner in induced than in natural malaria, and has been reported most frequently in *P. vivax* infections, probably because *P. vivax* is most used in therapeutic malaria.

The relationship between the sickle-cell phenomenon and malaria has been investigated by a number of workers. Previous workers have reported findings which indicated that the sickle-cell trait confers some protection against *P. falciparum* malaria. Raper (p. 736) studied the subject in Uganda, and found that the *P. falciparum* rate, and especially the count, were significantly lower in African children with the sickling trait than in non-sicklers. The sickle-cell haemoglobin appears to limit the severity of *P. falciparum* infections in non-immune subjects, though not to prevent the infection; the data do not permit an opinion on the effect on other parasites. No advantage due to the sickle-cell haemoglobin could be demonstrated in immune persons. In an area of Greece Deliyannis and Tavlarakis (p. 1136) found the sickling phenomenon in 23·6 per cent. of 500 unselected persons, yet in 136 malaria patients only 5·8 per cent. were sicklers. Among 17 children and adults suffering from malaria only one sickler was found, yet among their 31 siblings 22 were sicklers. [No information is given on the species of malaria parasites involved.] Archibald and Bruce-Chwatt (p. 605), however, examined Nigerian children for the sickle-cell trait and for evidence of malaria; they found no constant relationship between them. In American Negro volunteers, inoculated with *P. falciparum*, Beutler *et al.* (p. 739) could find only slight difference in the response of sicklers and non-sicklers, though there were some indications of benefit to the former.

Charles Wilcocks

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria—*monkeys, other animals, birds.*

Colbourne, M. J. **Malaria in Gold Coast Students on their Return from the United Kingdom.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, Sept., v. 49, No. 5, 483–7.

This investigation was undertaken to ascertain the effect on immunity to malaria produced by continued residence of not less than 2 years in the United Kingdom. The incidence of malaria and other ill health in 9 returned students and 12 controls were observed during periods ranging from 3 months to 1 year. The total investigation lasted 91 months. No advice was given as to the use of suppressive drugs but the anti-malarial measures taken were recorded and considered in the assessment. Although the number observed was small the investigation suggested that the returned students had lost some, but not all, of their immunity. In those returned students who do not take any antimalarial measures, an attack of malaria is probable during the first 12 months after returning to the Gold Coast, but it will probably not immediately be severe and will yield promptly to treatment. *Frederick J. Wright*

Cambournac, F. J. C. & Gândara, A. F. Subsídio para o conhecimento da endemia malárica em S. Tomé e Príncipe. [**Observations on Malaria Endemicity in São Tomé and Principe, Guinea**] *Anais Inst. Med. Trop.* Lisbon. 1955, Sept., v. 12, No. 3, 301–7, 2 maps.

The English summary appended to the paper is as follows:—

"Taking advantage of the concentrations made for the study of yellow fever virus, malarial indexes were performed in 528 native children, from 0 to 15 years old, and from 12 different zones.

"As a general average it was found: splenic index 42·8 per cent; medium spleen index 1·1; medium enlarged spleen index 2·7; splenometrical index 115·5.

"In the examinations for parasites in the blood the following data were found: total parasitic index 21·7 per cent; total gametical index 5·4 per cent; specific parasitic index in the infections by *Plasmodium falciparum* 17·2 per cent; specific parasitic index in the infections by *Plasmodium vivax* 3·8 per cent.

"*Plasmodium malariae* as well as *P. ovale* were not found."

Costa, J. L. & de Bustamante, F. M. Estimativa da incidência da malária no Brasil, no triênio 1950/1952. [**Estimated Prevalence of Malaria in Brazil during Triennium 1950/1952**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1954, Oct., v. 6, No. 4, 597–600.

In 1940 Barros Barreto estimated that the number of people suffering each year from malaria in Brazil approximated 6 millions, or about one-seventh of the population at that time. The population of the malarious areas of Brazil has increased very greatly since that time and the situation might have become much worse had it not been for insecticidal DDT spraying and new synthetic antimalaria drugs. Since 1949 DDT house-spraying has been applied to almost all centres of population in malarious areas. There are now some 23,000 centres for the free distribution of antimalaria drugs scattered throughout all the malarious counties of the country. The result has been a spectacular fall in malaria morbidity. The authors in this paper endeavour to estimate the incidence of malaria in Brazil during the 3 years 1950–1952, based on the returns of the posts and sub-posts of the National Service of Malaria and of antimalaria drug distribution centres. They conclude that the number of sufferers from malaria in Brazil each year from 1950 to 1952 averaged 160,000. Compared with the estimated 1940 malaria morbidity of 6,000,000 the latest estimated figure represents a decline of 97 per cent. *Norman White*

Chao, J. **Sterile Microdissection and Isolation of Malarial Oocysts.** *Science.* 1955, Oct. 21, v. 122, 763, 1 fig.

This paper gives a detailed description, and a photograph, of the apparatus used for the isolation of oöcysts of 20 μ diameter or more from mosquito stomachs and their transfer to artificial media for culture [this *Bulletin*, 1954, v. 51, 1229]. *D. S. Bertram*

See also p. 376, Oka, **I. A Biochemical Study on the Growth of the Mosquito, with special reference to the Changes in Protein, Fat and Carbohydrate Contents during its Development. II. A Morphological Study on the Growth of the Mosquito Larvae. III. The Vicissitude of Weight and Length during Mosquito's Growth. A Study on** *Culex pipiens* **var.** *pallens*.

Gillies, M. T. **The Pre-Gravid Phase of Ovarian Development in** *Anopheles funestus*. *Ann. Trop. Med. & Parasit.* 1955, Oct., v. 49, No. 3, 320–25, 2 figs.

About 20 per cent. of wild-caught *Anopheles gambiae* females require more than one blood meal to produce eggs [this *Bulletin*, 1954, v. 51, 1032]. A single meal will allow egg development to go only as far as stage II: females in this state were defined as "pre-gravid" and they were mainly newly emerged females which had had only their first meal. Females showing full maturity of their eggs after digesting a single blood meal were classified as gravid; they were multiparous, older

individuals. Comparable data for *A. funestus* are now presented and discussed. About 24 per cent. of this species caught wild proved to be "pre-gravid". Of over 2,000 pre-gravid females examined, 65·5 per cent. were fertilized and, in 500 examined for evidence of age from ampullar and related characters, 73 per cent. were in their first gonotrophic cycle, 20 per cent. were multiparous, and 7 per cent. were of doubtful age. The pre-gravid group in *A. funestus* is, as in *A. gambiae*, predominantly of newly emerged females. Laboratory observations suggest that some newly emerged females may, however, develop eggs fully on a single blood meal.

A comparison of the biting rate and pre-gravid rate for *A. funestus* in an experimental hut over nearly a year showed that large and small populations were associated with, respectively, high and low pre-gravid rates. Intermediate population levels were not, however, associated so clearly with changes in the pre-gravid level which tended to be fairly stable. Sporozoite rates were similarly stable with such population densities. These findings implied a basic stability in the age-composition of the *A. funestus* population when at moderate density which, in view of the semi-permanent nature of *A. funestus* breeding, is a reasonable result.

There are qualifications about the use of the pre-gravid rate of *A. funestus*, and of *A. gambiae*, for estimating the mortality rate of these mosquitoes in a wild population. It is not certain that all *A. funestus* require two blood meals for their first gonotrophic cycle and this has now been shown not to be necessary for all *A. gambiae* in one part of inland Tanganyika. Nevertheless, build-up and abrupt decline of an *A. funestus* population can be shown to consist of predominantly young and old females, respectively, and the stability of the age-composition of established populations confirmed by determining the pre-gravid rate for the different population levels. Similar useful data on the age-composition of populations of species other than *A. funestus* and *A. gambiae* may also be determinable. *D. S. Bertram*

Pritam Singh. **Observations on the Transmission of Malaria in Babina Area, Jhansi District, Uttar Pradesh.** *Indian J. Malariology.* 1955, June, v. 9, No. 2, 137–43, 1 map.

The observations on malaria reported in this paper were made from June to September 1953 in Jhansi district, Central India.

Spleen rates of 0–14 per cent. were recorded in the villages of Babina, Hirapur and Raipur, where DDT spraying had been done for 10 years. Spleen rates in Manpur and Chakarpur, where no spraying had been done, ranged from 11 to 30 per cent. Out of 70 blood slides examined, 3 contained *Plasmodium vivax* and 12 *P. falciparum*. The main transmission period is in August and September and intensity is high.

Among 8 species of *Anopheles* present, *A. culicifacies* and *A. annularis* were commonest, the others very rare. The chief breeding place for *A. culicifacies* is the Gurari Nala; for *A. annularis* it is the tanks containing cultivated waternut of the genus *Trapa*, and aquatic weeds.

Dissections showed positive gland infections in both species. Precipitin tests on 199 *A. annularis* showed a positive human reaction in 0·5 per cent.

Before this survey no dissections had been done to discover the malaria vector in this area and *A. annularis* was not suspected. This species is now considered to be a serious vector and its density is high owing to the cultivation of the waternut.

As both mosquitoes are domestic in habit the control method of choice is indoor DDT spraying. Routine antilarval treatment with paris green is done as an auxiliary measure. Incidentally, the paris green also kills the larva of a beetle which damages the waternut plants, the cultivation of which cannot be stopped because it is necessary to the livelihood of several families and its loss would cause destitution. *H. S. Leeson*

Rachou, R. G., Lôbo, A. G. S. & Luz, Ê. Dispersão do *Anopheles* (*N.*) *darlingi* no recrudescimento epidêmico de malária em 1950 no Norte do Paraná. [**Dispersal of *Anopheles darlingi* in the Epidemic of Malaria in 1950 in the North of Paraná, Brazil**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1954, July, v. 6, No. 3, 411–14, 1 map. English summary.

The English summary appended to the paper is as follows:—

"*Anopheles darlingi* is always found along the Paranapanema River, where it is the vector of endemic malaria. In the north of Paraná, in the valleys of the affluents of this river, malaria is epidemic with quinquennial or paraquinquennial periodicity, the last epidemic having occurred in 1950. The epidemic wave in these valleys progresses up-river and is generally preceded by the dispersion of *darlingi* in the same direction. By this dispersion *darlingi* reaches so far as 300 km. from the Paranapanema River (epidemic of 1950). During the years between the epidemics this anopheline practically disappears (not found with our normal methods of research) from these valleys, returning to the Paranapanema River."

Atienza, R. Y. **The Malaria Problem in Blood Transfusion.** *J. Philippine Med. Ass.* 1955, June, v. 31, No. 6, 266–70.

Between 1948 and 1954, 83,378 bottles of blood were transfused into 53,138 patients all over the Philippines. Thirty-eight recipients were reported to have developed malaria. This low figure may be attributed partly to failure to report cases and partly to the elimination of donors

with a malarial history: *P. vivax* was reported in 21 cases. The blood used was cooled at 4° to 6°C. for an average of 5 days. The " incubation period " of the malaria varied from 6 to 28 days. Chloroquine diphosphate was successful in dealing with the infections. The donors of the blood received by the 38 persons were " mostly with negative malaria history " or confessed to malaria 20–25 years earlier. All had negative blood smears [time relations to recipient's attack not stated], and remained negative months later; most of them had, however, lived in an endemic area.

The circumstances of the recipients in relation to the chance of acquiring malaria naturally at the time of transfusion are unfortunately not described.

The author, after summarizing the literature, concludes that malaria can be transmitted by transfusion of blood even after it has been refrigerated for several days at 4°C. *B. G. Maegraith*

See also p. 356, Demaeyer *et al.*, Enquête parasitologique et variations de la protéinémie en fonction de l'altitude chez les indigènes de la région de Katana-Lwiro. [**Examination for Parasites and Variations in Serum Protein as Functions of Altitude in Africans of the Katana-Lwiro Area**]

Tyagi, N. **Chemotherapy in Malaria.** *J. Indian Med. Ass.* 1955, Sept. 1, v. 25, No. 7, 261–2.

The author compares the treatment of *P. falciparum* malaria and *P. vivax* malaria by proguanil alone with treatment by proguanil and quinine and proguanil and mepacrine.

Proguanil and quinine was found to be the most successful treatment although there was little to choose between quinine and mepacrine as the additional drug.

[The results are in conformity with common experience. Few will, however, agree with the author that " quinine remains . . . the keystone in the treatment of malaria ". No reference is made to chloroquine or amodiaquine.] *Frederick J. Wright*

Boroda, C. **Treatment of Malaria with Single Doses of Mepacrine, Chloroquine and Amodiaquin.** *West African Med. J.* 1955, Sept., v. 4, No. 3, 144–8. [21 refs.]

The author set out to assess the cost to an estate in West Africa of *P. falciparum* malaria when employees were treated either by mepacrine (474 mgm. base) or chloroquine (600 mgm. base) or amodiaquine (200 mgm. base), in single doses, in 3 comparable groups. If symptoms or parasitaemia were present on the second day treatment was repeated, similarly on the third day for those persisting from the second dose.

The cost is represented by the sum of the estimated loss of productive work and the cost of the tablets. The clinical results with amodiaquine and chloroquine were similar but mepacrine was somewhat inferior. The total cost was least in the group treated by amodiaquine (£27 10s. 9d. per 100 patients) and identical in the other two groups (£31 8s. 10d. per 100 patients). The author concludes that amodiaquine in as low a dose as 200 mgm. base is adequate and is the cheapest form of treatment for labourers in his locality. [The results are suggestive but it is difficult to assess the part played by premunity. Fully to justify the conclusion it should be shown that chloroquine, 150 mgm. base, is inferior to amodiaquine, 200 mgm. base, under the same conditions.]

Frederick J. Wright

Gutiérrez Ballesteros, E., Manzano, J. & Molina Pasquel, C. Tratamiento del paludismo clínico con azacrín. [**Treatment of Clinical Malaria with Azacrin**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1955, June, v. 15, No. 2, 51–5.

The English summary appended to the paper is as follows:—

"The present report gives account of a trial with Azacrin in Mexico City.

"36 adults, patients with clinical malaria due in 32 instances to *P. vivax*, 3 to *P. falciparum* and 1 to both species, were treated with Azacrin, administered orally in the form of tablets of 100 mg.

"The first day 4 tablets (400 mg.) were given, followed 6 hours later by 2 more tablets (200 mg.). The second day 2 tablets more (200 mg.) were given and 2 tablets (200 mg.) on the third day.

"Azacrin proved to be a good schizonticide, all parasites disappearing from the blood stream within 60 hours average for *P. vivax* and 48 hours average for the asexual forms of *P. falciparum*.

"We did not notice any direct action against gametocytes.

"Acute clinical attacks of malaria were suppressed within 30 hours average for vivax malaria and 24 hours average for falciparum malaria.

"Toxicity practically was nil in therapeutic dosage.

"There were 3 relapses by *P. vivax*, two cases 17 and one 22 days later to the end of treatment."

[See also this *Bulletin*, 1953, v. 50, 477; 1954, v. 51, 674, 1224.]

Chaudhuri, R. N., Dutta, B. N. & Chakravarty, R. N. *Dichroa febrifuga* **and a Synthetic Hydrangea Alkaloid in Malaria.** *Indian Med. Gaz.* 1954, Nov., v. 89, No. 11, 660–64, 5 figs. [13 refs.]

Dichroa, a plant used in China as a febrifuge [this *Bulletin*, 1949, v. 46, 614], contains as an active principle the alkaloid febrifugine [*ibid.*, 1950, v. 47, 1177], which is also present in the leaves of the hydrangea [*ibid.*, 1953, v. 50, 91]. Synthetic analogues of this alkaloid have been prepared

and one, 1698L, was tested by the authors, together with an alcoholic extract of *Dichroa* roots from the Himalayas, against *P. berghei* infections in mice and *P. falciparum* and *P. vivax* human infections. Some action was observed in mice but the results in human malaria were poor. Patients either failed to respond or the disease recrudesced shortly after treatment. Toxic effects included nausea and vomiting.

B. G. Maegraith

Miller, M. J. **Suppression of Malaria by Monthly Drug Administration.** *Amer. J. Trop. Med. & Hyg.* 1955, Sept., v. 4, No. 5, 790–99, 3 figs.

The author describes a carefully controlled experiment carried out in schools in 3 different locations in a hyperendemic zone in Liberia. The subjects were 217 African children between the ages of 5 and 14 years. The drug schedules were: Group A, pyrimethamine 25 mgm. monthly for 8 months; Group C, primaquine diphosphate 15 mgm. weekly for 12 weeks; Group D, chloroquine 150 mgm. (base) monthly for 8 months; Group F, pyrimethamine and chloroquine in above doses at monthly intervals for 6 months. Groups B, E and G were controls.

Parasites were effectively abolished by pyrimethamine, chloroquine and in combination. Pyrimethamine was rather superior to chloroquine. Primaquine was ineffective except on the gametocyte rate. No evidence of the development of resistance to pyrimethamine was found. Gametocyte production appears to be effectively reduced by controlling asexual development [this *Bulletin*, 1954, v. 51, 1036]. No change was found in spleen rates and it is suggested that this may be evidence of a continuing immunity in the presence of controlled malaria. Monthly administration seems to be practicable and if the risk of drug resistance can be overcome, perhaps by the addition of chloroquine, pyrimethamine might become the drug of choice. Continuing parasitaemia in the control groups support the author's deductions. [Little evidence is given of the morbidity caused by the parasitaemia.] *Frederick J. Wright*

Cambournac, F. J. C., Gândara, A. F. & Pena, A. J. Estudo da acção profilática do Daraprim numa comunidade indígena (Missão Católica do Huambo, Angola). [**Study of the Prophylactic Action of Daraprim (Pyrimethamine) in Africans in Angola**] *Anais Inst. Med. Trop.* Lisbon. 1955, Sept., v. 12, No. 3, 341–57, 7 graphs. English summary.

The experiment described was designed to test the prophylactic value of Daraprim (pyrimethamine). An African Community in the care of the Catholic Mission at Huambo, 20 kilometres from New Lisbon, Angola, was selected for the purpose. Two hundred children below the age of 15 were divided into two, experimental and control, groups. Each member of the former group received a weekly dose of Daraprim for 5½

months, 12.5 mgm. a week for children under 8 years of age, 25 mgm. for children above that age. The children in the control group received a placebo in tablets resembling in appearance the Daraprim tablets. At the end of the 5½ months the parasite rate of the treated group had fallen from 15 per cent. to zero: that of the control group had risen from 11.4 to 21.9 per cent. Infections were almost exclusively with *P. falciparum*. The spleen rate of the experimental group fell from 35.4 to 6.5 per cent.: that of the control group rose from 32.1 to 61.6 per cent. Daraprim was thus shown to be a very effective suppressive of malaria in Angola. *Norman White*

Mohan, B. N. **Experimental Studies on Reproductive Capacity of** *Anopheles fluviatilis* **and** *Anopheles stephensi* **(Type) after Exposure to Sublethal Doses of D.D.T. in different Stages of Gonotrophic Cycle.** *Indian J. Malariology.* 1955, June, v. 9, No. 2, 85–93.

Experiments were designed to investigate the effects of sublethal exposures to DDT residues on the mosquitoes *Anopheles fluviatilis* and *A. stephensi*. Females were exposed for 5 or 10 minutes in small cages lined with paper impregnated (by acetone solution) with DDT at the rate of 12·5 mgm. per square foot. Fertilized or unfertilized females were used and they were exposed (i) before a blood meal, (ii) a few hours after a blood meal, or (iii) in a partially gravid condition. The exposure to DDT had very little effect on the subsequent maturation of eggs in the ovaries. [The author says "no effect"; but some slight reduction of percentage maturation seems to occur with both mosquitoes when exposed before a blood meal.]

The effect of fertilization in increasing the proportion of maturation was evident in all cases. Exposure of gravid females did not prevent them from ovipositing, but a proportion of them laid eggs indiscriminately instead of in the bowl of water provided.

After exposure to DDT, partially paralysed males could not swarm or dance, but they attempted to mate with normal females, some successfully. Normal males inseminated partially paralysed females. When both sexes were affected by DDT, there was no swarming and very little mating. *J. R. Busvine*

Soper, F. L. La erradicación de la malaria en el Hemisferio Occidental. [**The Eradication of Malaria in the Western Hemisphere**] *Bol. Oficina Sanitaria Panamericana.* 1955, Mar., v. 38, No. 3, 231–6.

The XIV Panamerican Sanitary Conference at Santiago in October 1954 gave a mandate to the Panamerican Sanitary Office to formulate plans without delay for the eradication of malaria from the American Continent. It was stated that malaria can be eradicated from a given

area in a few years by the use of insecticides; it is necessary that the measures be applied to all malarious areas in the countries concerned; that the possibility of American *Anopheles* acquiring DDT resistance be constantly borne in mind; and that the removal of the economic burden that malaria imposes on a population, together with the cost of partial control measures hitherto applied, will amply justify the expenditure that eradication will entail.

A few paragraphs of this paper are devoted to the economic importance of malaria. Some examples are given of eradication programmes that have already been carried out in the Western Hemisphere. Some measures of partial control now being carried out in some countries, including DDT spraying in limited areas, involve the risk of producing DDT-resistant anophelines which might jeopardize the success of eradication campaigns: hence the need for embarking on comprehensive programmes without delay.

The cost of eradication campaigns may be beyond the resources of some countries. The help of international organizations is being solicited. The Panamerican Sanitary Office of the World Health Organization is giving technical and other assistance in 21 of the 36 territories or countries concerned. UNICEF is helping in 19. *Norman White*

Bol. Oficina Sanitaria Panamericana. 1955, Mar., v. 38, No. 3, 237–9. Erradicación de la malaria en las Américas. [**Eradication of Malaria in the American Continent**]

This is an aide-mémoire prepared by the Panamerican Sanitary Office for the XIV Panamerican Sanitary Conference dealing with the ways and means of carrying out the malaria eradication programme [see above]. *Norman White*

Alvarado, C. A. Situación de la lucha antimalárica en las Américas. V informe. [**Progress achieved in the Malaria Eradication Campaign in the American Continent**] *Bol. Oficina Sanitaria Panamericana.* 1955, Mar., v. 38, No. 3, 240–58.

This is a somewhat abridged edition of a report that was prepared for the consideration of the XIV Panamerican Sanitary Conference. The first part consists of a critical appraisement of the progress realized in the various countries of the American Continent towards the ultimate goal of malaria eradication. On balance the progress has been satisfactory though certain countries have not fully maintained the enthusiastic activity of the previous 4-year period which demonstrated the brilliant results that could be achieved by the use of residual insecticides.

A short description is given of the organization, responsibilities and limitations of the National Malaria Services in the different countries of

the Continent and of the professional and technical personnel engaged in the campaign: the legislation concerning malaria and its control is also reviewed.

Figures are given to illustrate the magnitude of the problems involved. In 1950 the population living in malarious zones of the Continent approximated 135,000,000. The elimination of endemic malaria from the United States has contributed chiefly to the marked improvement in the outlook. There are now 60,000,000 (44·4 per cent.) living in "eradication areas", 45,000,000 (33·3 per cent.) in areas "under protection", and 30,000.000 (22·2 per cent.) in unprotected areas. Of the unprotected population 63·7 per cent. live in Mexico and 13·1 per cent. live in Colombia.

Malaria has been practically eradicated from Argentina, from four provinces of Ecuador, and from 30 per cent. of the malarious areas of Venezuela. Malaria and its vector, *A. darlingi*, have both been eradicated in the coastal districts of British Guiana in which live 95 per cent. of the population of that Colony. Malaria in French Guiana had been practically eliminated.

Emphasis is laid on the necessity of coordinating eradication programmes in the different countries, of preventing the reimportation of infection into eradication areas, and of full epidemiological investigation of such malaria cases as may occur. Experience has shown that eradication of malaria is a practical proposition: administrations are urged to realize to the full the economic and health implications of such an achievement. The possibility that some or other of the local vectors might acquire resistance to the insecticides used indicates the desirability of eliminating all foci of infection without undue delay. *Norman White*

Gabaldon, A. Enseñanzas para la acción sanitaria en la América Latina derivadas de la lucha antimalárica en Venezuela. [**Lessons which Public Health Administrations in Latin America may learn from Anti-Malaria Campaign in Venezuela**] *Bol. Oficina Sanitaria Panamericana.* 1955, Mar., v. 38, No. 3, 259–65.

Venezuela was the first country to start, on a national scale, an anti-malaria campaign based on the spraying of dwelling houses with DDT. The work began in 1945 and by 1950 84 per cent. of dwellings in the malarious regions of the country were being regularly sprayed every 6 months. The marked reduction in malaria incidence thereby effected was accompanied by a collateral effect of great importance. This was a great reduction in the high mortality hitherto attributed to diarrhoea and intestinal infections and was brought about by the destruction of house-flies with DDT. The general mortality rates in treated areas showed a marked decline. Thus there was a remarkable improvement of general health conditions in a very short space of time, an improvement that

would have taken orthodox public health activity many years to effect. This improvement involving as it does marked modification of the age distribution of the population will necessitate among other things an increase in educational facilities. *Norman White*

Lefrou, G. & Martignoles, J. Contribution à l'étude de *Plasmodium kochi*. *Plasmodium* des singes africains. [**Contribution to the Study of** *Plasmodium* [*Hepatocystis*] *kochi*, *Plasmodium* **of African Monkeys**] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 2, 227–34, 1 coloured pl. & 2 charts.

Working in French Guinea, the authors found from 4 to 70 per cent. of baboons in different localities infected with "*Plasmodium*" *kochi*. A detailed description is given of the [well-known] forms appearing in the blood, which are said to be represented by "schizonts" varying in size and appearance, on the one hand, and by male and female gametocytes, on the other. Since no stages of division of the so-called "schizonts" were observed, it is concluded that "schizogony must take place in the inner organs, as in *P. falciparum*". [The authors are thus unaware of the important work by Garnham (this *Bulletin*, 1948, v. 45, 683), who described the entire schizogonic development of this parasite in the liver of monkeys, and transferred it to the genus *Hepatocystis*, to which the *kochi* parasite is now generally referred.]

The parasite described in this paper is compared with other variants of this species (varieties *kochi*, *bouilliezi*, *macfiei* and *joyeuxi*) and is attributed to the last-named variety (the differential characters of the 4 varieties are given in tabular form).

The infection in baboons runs a latent and symptomless course, which the authors regard as a state of premunition. Attempts to induce the appearance of symptoms by splenectomy of 3 infected animals produced increased parasitaemia only in one baboon, but without any marked change in its temperature.

The paper is illustrated by a coloured plate depicting the blood forms of the parasite. *C. A. Hoare*

Sen Gupta, P. C., Ray, H. N., Dutta, B. N. & Chaudhuri, R. N. **A Cytochemical Study of** *Plasmodium berghei* **Vincke and Lips, 1948.** *Ann. Trop. Med. & Parasit.* 1955, Oct., v. 49, No. 3, 273–7. [15 refs.]

Earlier experiments on the chemical structure of *P. berghei* have been reported [this *Bulletin*, 1953, v. 50, 282; 1954, v. 51, 22]. The present authors now report on the detailed examination they have made of the cytochemical structure of the parasite. The methods used were similar to those of Ray *et al.* [this *Bulletin*, 1955, v. 52, 536] in their study

on *E. histolytica*. Mitochondria and the Golgi apparatus were clearly demonstrated by the use of Janus green and neutral red respectively. The change in colour after Janus green and final fading of these structures were believed to result from oxidation-reduction processes. Deoxyribose-nucleic acid (DNA) was shown to be present in small amount in the chromatin of the parasite by a number of staining methods. In the cytoplasm ribosenucleic acid (RNA) was demonstrated in considerable amounts and to a much smaller extent in the nucleus. During parasite growth both DNA and RNA increased in amount. An attempt to demonstrate the presence of polysaccharide and glycogen was not very successful. Alkaline phosphatase was present around the chromatin and in very small amounts in the cytoplasm, which also contained acid phosphatase. The possible functions of these enzymes is discussed. *J. D. Fulton*

Arcoleo, G. & Carrescia, P. M. Quadri evolutivi ed ematici nelle infezioni da " Plasmodium berghei " del topo albino. [**Course of Disease and Blood Changes in Mice infected with** *Plasmodium berghei*] *Riv. di Malariologia*. 1955, June, v. 34, Nos. 1/3, 25–36, 4 graphs. [19 refs.] English summary (9 lines).

The authors inoculated 20 white mice intraperitoneally with infected blood containing from 1 to 291 million *Plasmodium berghei*, and observed the course of the infection and blood changes by daily counts of the red cells in a haemocytometer and by differential counts of normal and basophilic cells, and of parasitized cells in Giemsa-stained blood films. These counts were compared with those in the blood of control animals.

The results, illustrated in a number of tables and graphs, were as follows. In mice inoculated with heavy doses of parasites, the prepatent [incubation] period varied between 24 hours and 4 days, but in those inoculated with low doses (up to 3 million parasites) it was prolonged to 7–9 days. However, the number of parasites inoculated had no influence on the course of the infection. The patent period in all the animals was initiated by invasion of the scanty basophilic cells present in the circulation, thus indicating the tropism of the parasites for these cells, which persist during the first 3 days, after which normal erythrocytes become heavily parasitized. The subsequent course of infection varied in different mice: in one group there was a rapid invasion of normal erythrocytes, with an average parasitaemia of 20 per cent., killing the animals before severe anaemia set in, whereas in another group there was a considerable increase in the number of basophilic cells in the blood; these were rapidly parasitized, and the mice died with symptoms of severe anaemia, after a longer period of infection than in the first group.

It is concluded that, although in general the severity of the infection is correlated with the number of basophilic cells present in the blood, its course may be accelerated if the production of these cells is diminished

and a massive invasion of normal erythrocytes takes place. However, the exact cause of this phenomenon remains unknown. *C. A. Hoare*

Carrescia, P. M. Infezioni da " Plasmodium berghei " in topi albini di varie età a dieta lattea. Recidive e reinoculazioni. [**Infection of Mice of different Ages kept on Milk Diet with** *Plasmodium berghei*; **Relapses and Reinoculations**] *Riv. di Malariologia.* 1955, June, v. 34, Nos. 1/3, 93–7. English summary.

The author studied the effect of a milk diet in mice of different ages infected with *Plasmodium berghei.* Of 37 young animals, whose age did not exceed 47 days, 28 were kept on a milk diet and 9 on a normal diet. Though all the animals died as the result of the infection, those fed on milk survived on the average for about 14 days, compared with about 9 days in the group kept on a normal diet. As regards 23 infected adult mice which were kept on a milk diet, 12 of them recovered and 11 died after infection lasting on the average 22 days.

In a number of cases, mice, which had recovered from the infection after having been kept on a milk diet, relapsed and died when returned to the usual laboratory diet. Reinoculation of recovered mice was in some cases successful, while in others the mice remained resistant to infection. *C. A. Hoare*

Corradetti, A., Tentori, L. & Verolini, F. Osservazioni sull'infezione da *Plasmodium berghei* in ratti tenuti a dieta lattea. [**Observations on Rats kept on a Milk Diet and infected with** *Plasmodium berghei*] *Rendiconti Istituto Superiore di Sanità.* Rome. 1955, v. 18, Pts. 3/4, 256–60. [10 refs.] English summary (5 lines).

Experiments on the effect of a milk diet on the course of *Plasmodium berghei* infection were carried out on 62 rats aged 2 to 3 months. Some of the rats were kept on a pure diet of milk, in others this was supplemented with 0·1 per cent. *p*-aminobenzoic acid, and another group (controls) was fed on a normal diet. Most of the animals were infected with an Italian strain while others were infected with a strain of *P. berghei* obtained from London.

The results are given in tabular form, showing that there was no difference in the course of the infection in any of the groups of rats, irrespective of whether they had been kept on a milk diet or not.

In discussing the causes of the divergent results obtained in these experiments and those by other workers, the authors consider the effect of variation in composition of the milk used, the content of PAB and of folic acid, and arrive at the conclusion that the response of rats kept on milk diet to the infection is due to some variable factors which escape detection, but which may result in some cases in complete, in others in

partial suppression of the infection, whereas in other cases again (as in the present investigation) milk may have no inhibiting effect whatsoever.

C. A. Hoare

Corradetti, A., Toschi, G. & Verolini, F. Comportamento dei componenti proteici del siero durante l'attacco primario nei ratti infetti da *Plasmodium berghei*. [**Behaviour of the Protein Constituents of the Serum, during the Primary Attack, of Rats infected with** *Plasmodium berghei*] *Rendiconti Istituto Superiore di Sanità*. Rome. 1955, v. 18, Pts. 3/4, 246–55, 1 fig. English summary (8 lines).

The English summary appended to the paper is as follows:—

"The behaviour of the serum proteins was followed during the primary attack on 26 rats infected with *Plasmodium berghei*. The electrophoretic pattern showed a raise in the percentage of the γ globulins at the 12th and 16th days from inoculation, i.e. in correspondence to the usual period of parasitolytic crisis. No significant variations of the serum total N was observed in those rats which were tested for it. The electrophoretic pattern of control rats showed no significant variations of the different protein fractions."

TRYPANOSOMIASIS

In this section abstracts are arranged as far as possible in the following order:—African—*human, animal;* American—*Chagas's disease and other trypanosome infections. In each form the following order is followed:*—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

Buxton, P. A. **Tsetse and Climate: a Consideration of the Growth of Knowledge.** [Presidential Address, 2nd Feb. 1955.] *Proc. Roy. Entom. Soc. of London.* Ser. C. 1954–1955, v. 19, 71–8, 4 figs. [13 refs.]

In his address from the chair the President of the Royal Entomological Society of London [whose recent death is so deeply and widely regretted] presented in brief outline a thesis he had elaborated in greater detail in his recently published book [see this *Bulletin*, 1955, v. 52, 853]—the combination and interaction of field and laboratory research to produce and refine practical measures of tsetse control. Limiting his field to the northern part of Nigeria and adjacent regions, he described how Lloyd, Johnson and others [*ibid.*, 1925, v. 22, 290; 1927, v. 24, 891; 1934, v. 31, 66] laid the foundations by field investigations which pioneered the quantitative approach and related the distribution of the insect to its habitat and to seasonal differences in the climate. He related how these studies

led to the recognition in West Africa of those primary permanent foci and secondary temporary foci which SHIRCORE had already distinguished in Nyasaland [*ibid.*, 1914, v. 3, 427] and for the first time pointed out how the numbers in which the flies are caught depend not only on their actual density but also on their activity.

The author then gave an account of the investigation carried out by him and D. J. LEWIS in these regions [*ibid.*, 1935, v. 32, 369], in which the early work was followed up by a combination of laboratory studies on the fly and field studies of the physical factors in their habitat; in these use was made of techniques elaborated by him in the London School of Hygiene and Tropical Medicine. He showed how these gave further exactness to our ideas on the relations between the tsetse and its environment. From these the thread led back to the field studies then undertaken by NASH [*ibid.*, 1935, v. 32, 723; 1937, v. 34, 111 *bis*; 1940, v. 37, 696] which carried still further our knowledge of the interaction of the climate and the fly, resolving certain puzzles raised by earlier work. These studies showed how the fly was limited only to very restricted parts of the primary foci at the height of the dry season's severity and led to even further precision and economy in the control of the fly. In passing, the author drew on an area outside his self-imposed limits to illustrate how nicely these field studies of Nash were illuminated by some laboratory work carried out by JACK and WILLIAMS in Southern Rhodesia [*ibid.*, 1938, v. 35, 338]; this had shown a reversal in the tsetse's reaction to light when the temperature rose above 35°C., and thus suggested a mechanism whereby the restriction of the fly to the most protected portions of its primary focus might be brought about. Application of this knowledge to control showed how impossible it was to lay down in general terms the amount of clearing needed for the elimination of even a single species of tsetse, for this can only be done for a particular climatic zone; in areas where physical conditions are extreme and therefore more than usually inimical to the fly, less clearing will be needed than in those of more moderate climate offering easier conditions for the fly.

The theme outlined above was developed with all the lucidity and conciseness which were characteristic of the author, and with an elegance impossible to convey in a summary of this nature; as a result, the reader is led easily and delightfully through a maze whose complexity and difficulty are thereby minimized. *W. H. Potts*

NASH, T. A. M. **The Fertilisation of** *Glossina palpalis* **in Captivity.** *Bull. Entom. Res.* 1955, Aug., v. 46, Pt. 2, 357–68, 1 fig.

The production of puparia in the laboratory has generally been unsatisfactory, for the resulting numbers tend to be insufficient to maintain the population, let alone increase it. GEIGY [see this *Bulletin*, 1949, v. 46,

122] was the first to record any measure of success in this field. In the paper under review Nash gives an account of some of the difficulties encountered at Kaduna in Northern Nigeria in applying this technique to the mass production of tsetse puparia for experimental work; the investigation of these has led to some improvements in the technique.

In spite of following the methods described by Geigy the reproduction rate was so low as to suggest poor fertilization of the females; dissection of a small sample of the stock flies showed over a quarter of them to be infertile. Nash attempted to improve this figure by putting the males and females together at the most suitable ages; in this he followed Mellanby who had worked on *G. palpalis fuscipes* in Uganda [see *ibid.*, 1937, v. 34, 558]. The results were, however, so disappointing that a re-examination of the question was undertaken. This gave results agreeing well enough with Mellanby's figures for the age at which males become fully potent, but disagreeing with his conclusion that only males over 5 days old could mate successfully, for nearly 4 per cent. of the females segregated within 24 hours of emergence were fertilized.

When, however, Nash turned his attention to the age of attractiveness of the females, his results did show a considerable divergence from those reported by Mellanby, which had indicated a maximal attractiveness at between 5 and 8 days. Nash's results suggested that it is unwillingness of the female to accept mating rather than her relative attractiveness to the male that is important, and that females from 1 to 5 days old were much more willing to copulate than those of 6–8 days. Detailed analyses of the data showed that the fertilization rate of the 3-day-old females was significantly above the average (84 per cent. compared with 71 per cent.). Nash noted that there was very considerable variation between the fertilization rates of small batches, which might account for the difference between his and Mellanby's conclusions.

As a result of these findings, Nash adopted the practice, in his large-scale breeding experiments, of mating all females on their 3rd day with twice as many males, none of which was less than 7 days old; the resultant females were then kept at the rate of 20 per Bruce box to which were added 5 young males, with the object of fertilizing some of the females that had escaped impregnation in the mating cages or of re-fertilizing any old females that might have used up their stock of sperm. In testing the results of this procedure he compared females mated with twice their number of males (normal rate) and those mated with nearly equal numbers (57 per cent.), and found that on the 16th day the females showed practically identical fertilization rates (88 per cent. and 87 per cent.); these figures agreed favourably with, though not quite reaching, the average proportion fertilized (96 per cent.) among wild females [Nash and Page, *ibid.*, 1953, v. 50, 1124]; some of the batches of 50 females showed percentages as high as the wild ones. The fact that the percentage is so high the author attributes mainly to the use of the 3-day-old females.

He also gives figures that suggest a decrease of spermathecal content with age, noting in this connexion Squire's finding *ibid.*, 1952, v. 49, 376] that 5 per cent. of wild females of his oldest age-group had empty spermathecae. He was not able to convince himself whether a number of doubtful cases of old females were really showing empty spermathecae, or whether this appearance was due to a darkening or thickening of the spermathecal wall. But he did show that some old females could be both attractive and willing for re-fertilization. He also produced evidence that the reproductive capacity of the females decreased with old age.

He gives some interesting figures for the time required to mate females, and concludes that copulations are only a quarter as numerous 6 hours after the time the sexes were put together as they were shortly afterwards, and that 20 hours after there are very few matings; after 23 hours copulation had virtually stopped. He demonstrates that this cessation was due to unwillingness of the remaining females to mate, and that this could be overcome by feeding them; it was not due to loss of attractiveness, or to weariness of the males. He also describes a method of assessing the degree of impregnation which gave a " spermathecal value " indicating the extent to which each spermatheca had been filled with sperm; it appeared, however, that this was uniformly high at all ages of the females. *W. H. Potts*

Reid, E. T. M. **Some Observations on** *Glossina morsitans ugandensis* **Vanderplank in the Sudan.** *Acta Tropica.* Basle. 1955, v. 12, No. 3, 193–221, 7 figs. [32 refs.]

There are five small islands of thicket and bush in the plains north of the main fly belt in the southern Sudan. *Glossina morsitans* (as *ugandensis* in the east and as *submorsitans* in the west) is widely distributed in the main fly belt and also infests the islands, of which 4 are grouped together as the Jur Narrows Islands. The river Jur runs in the plain between these islands of bush. Roads and cattle routes also cut across the intervening plains, but pass close to the fly-infested islands at certain points and sometimes through them. Details of the vegetation and available game hosts, and of the distribution of fly in relation to these characteristics and their seasonal changes, are given for Nyang Island and Galual Island.

Galual stands much higher than Nyang. The vegetation in Galual is clearly divisible into several zones: the *flood plain*, which surrounds the islands and which is free from tsetse flies; growths of a tree, *Mitragyna inermis*, at the junction of forest and plains round the perimeter of the island and the edges of depressions within the island area; *light thorn savannah* mainly of rather shadeless *Balanites* and *Acacia* bushes; *deciduous savannah*, on the higher ridges, composed of many species of tree but not close-growing so that there is a good deal of open space and

grass; the *intermediate thicket zone* (many species of bush and tree) which is a transitional zone between the *deciduous savannah* and the *light thorn savannah*.

The deciduous savannah is a fertile soil, free from waterlogging in the rains. Fierce grass fires after the rains check vegetational density. In the dry season the leafless condition of the trees makes it too exposed for game and tsetse. In the other zones defoliation also occurs and, in the rains, waterlogging of the soil increases as one approaches the flood plains. *Mitragyna inermis* produces a fresh crop of leaves as soon as the old ones drop. Stands of this tree remain foci of *G. morsitans* and game in the dry season when, elsewhere, exposure and aridity are severe and unsuitable. Intensive breeding occurs at the bases of the trees. With the rains the fly, its breeding, and game are more evenly dispersed. At the height of the rains extensive waterlogging occurs over much of the area. Game recede towards the drier ground of the deciduous savannah on the ridges. Fly, like the game, also concentrate in this way.

The Nyang area, being lower lying than Galual, is less arid in the dry season and foliage persists on the trees and bushes for most of the year. The vegetational zones are less pronounced. *G. morsitans* survives and breeds throughout the year in thickets and the dependence on *Mitragyna* stands and seasonal changes in fly distribution are not marked as in the more extreme conditions of Galual. Game is scarce, being mainly baboon and warthog. Human settlement is much more prevalent than in Galual. *G. morsitans* is scarce, probably owing to these factors.

Animals presumed by observation to be likely hosts of the tsetse are buffalo, baboon, tiang, warthog, waterbuck and giraffe but results by precipitin test of 50 gut smears of tsetse are awaited with interest. [There is a slip on p. 206 in the use of "beasts" instead of "tsetse flies".] Addenda to the main paper give this additional information. Game eradication in Galual and Nyang has been in force since 1953. Details are to be published later, but it appeared that tsetse were still living on baboon blood in early 1955, particularly in Nyang. The results of the 50 tsetse gut smears taken in the survey of 1951–52 detailed in the main abstract were: 29 negative (probably insufficient serum protein in the digested meals); positive for man (7), buffalo (4), warthog (4), bushbuck (2), roan (2), waterbuck (2), rhinoceros (1). One fly had fed on both buffalo and warthog. None had fed on monkey, baboon, tiang, or hartebeeste. Meals on man are thought to be from the fly-boys. The differences between general observation and the facts from the precipitin test are noted without further discussion. The determinations of hosts by precipitin test were carried out by Dr. B. Weitz at the Lister Institute, London.

Cattle being herded past these islands become infected with *Trypanosoma congolense* and *T. vivax*. Once out in the neighbouring plains on trek or for grazing, transmission among the cattle still goes on in the absence of tsetse-fly. It would seem that mechanical transmission by

tabanids and *Stomoxys* is responsible [this *Bulletin*, 1953, v. 50, 769]. In 20 minutes as many as 2000 *S. nigra* have been taken from a pony.

Other species recorded elsewhere in the Sudan are *G. palpalis fuscipes*, *G. tachinoides*, *G. longipennis*, *G. fusca*, *G. fuscipleuris* and *G. pallidipes*.

D. S. Bertram

Marneffe, J. Observation d'un foyer de *Trypanosomiase rhodesiense* en Urundi. Historique et aspect géographique—Clinique—Traitement —Prophylaxie—1954–1955. [**Observations on a Focus of** *Trypanosoma rhodesiense* **Infection in Urundi, Belgian Congo**] *Ann. Soc. Belge de Méd. Trop.* 1955, June 30, v. 35, No. 3, 357–88.

In March 1954 a form of human trypanosomiasis was discovered in Muhinga (Urundi Province) adjacent to Tanganyika Territory, where human trypanosomiasis had not previously been recognized. The affected area lay between the 1200- and 1800-metre contours in the *morsitans* flybelt which extends along the eastern Boundary of Ruanda-Urundi. The only tsetse found here is *Glossina morsitans morsitans* and it is responsible for the maintenance of *Trypanosoma vivax* and *T. congolense* in the local stock. Though *T. rhodesiense* is known to occur at neighbouring foci in Tanganyika, it has not hitherto been found here or elsewhere in the African territories under Belgian administration. There was, however, no doubt that this organism was the cause of the outbreak, and 97 infected persons were found among 7,500 living in an area of 160 square kilometres; 63 of them were among the 445 inhabitants of the Murama and Meru hills which are covered with wooded savannah. Pentamidine or Moranyl [Antrypol, suramin] prophylaxis of the uninfected was started but 2 further cases of infection were later disclosed, one having had a protective dose of pentamidine 139 days earlier and the other a dose of Moranyl 71 days earlier. The former patient probably had had his pentamidine injection before acquiring the infection, but in spite of this there were changes in the cerebrospinal fiuid (CSF). The occurrence of this case casts some doubt on the efficacy of pentamidine injection as an effective prophylactic against *T. rhodesiense* infection.

The untreated became bedridden within 8 to 12 months, but the classical sleeping sickness state developed in only one patient. Usually the patients suffered a variety of troubles, with mental dullness, before becoming comatose. The facial tics, choreic movements, and convulsions usual in *T. gambiense* sleeping sickness were not observed. The glanduiar enlargements were less and were firmer than in *T. gambiense* infections; the blood contained many parasites in the early stages when symptoms and signs were few; change in the CSF took place about 3 months after infection. Nineteen (20 per cent.) of the disclosed patients died, some of them in spite of treatment, and 18 of these had central nervous system [CNS] involvement.

Pentamidine, tryparsamide, Moranyl and Arsobal were the drugs used

for the treatment of 76 cases. Pentamidine produced an effective immediate response in early cases with lymphatic and sanguineous infections; it is yet too early to say these are fully cured. Tryparsamide was given alone, or preceded by Moranyl, or it was given together with Moranyl. Only in those with very early CSF changes can a satisfactory response to tryparsamide be expected. Moranyl also, is immediately effective in lymphatic-sanguineous cases with early CSF changes. Its great virtue lies in the fact that it does not cause drug resistance. In cases with advanced CNS involvement a course of tryparsamide, followed after an interval by a course of Moranyl treatment, repeated as necessary, may control the infection but is not really effective treatment. Arsobal, but for its very severe toxic effects, is a potent and effective curative drug. It may cause massive lysis of trypanosomes and thus, particularly in these late stage cases, is very toxic and precipitates arsenical coma. In these cases a preliminary treatment with a less potent trypanocide, such as pentamidine, tryparsamide, or Moranyl, may produce a more gradual destruction of the parasites and so lessen, though it does not entirely avert, the dangers of grave toxicity from subsequent Arsobal treatment. With various pretreatment methods along these lines Arsobal gave good results both in early and in late cases with advanced CNS involvement. Arsobal should not be given except in hospital, where a close watch can be kept on the patients under treatment; it is a highly toxic drug, and it is most toxic in the most advanced cases. Nevertheless it offers for the first time a hope of cure and should replace tryparsamide for the treatment of these otherwise incurable cases of *T. rhodesiense* infection. Tryparsamide not only is ineffective in these but is likely to engender arsenic-resistance.

[This interesting paper should be consulted in the original for details of the courses of treatment and the results obtained from them. They are clearly set out in a series of tables. (See also this *Bulletin*, 1955, v. 52, 878.)] *A. R. D. Adams*

Nigeria, Northern. **Report of the Sleeping Sickness Section of Medical Department, Northern Nigeria. April 1st, 1954–March 31st, 1955.** 19 mimeographed pp. 1955.

This report deals with the achievements, problems and research of the past year. The incidence of human trypanosomiasis has dropped from 0·23 in 1953–54 to 0·21 among 1,673,312 people examined. The relapse rate had been rising steadily for the previous 6 years owing to failure of complete treatment and to an increase in the arsenic-resistant cases. It has now dropped slightly to 20·5 per cent. In areas where arsenic resistance is encountered Melarsen is being used, and Mel B has proved valuable in relapse cases in hospital but is too toxic for mass treatment. Pentamidine prophylaxis has been very successful in protecting mine

labour forces and may be employed at other mines. There has been difficulty in obtaining a good attendance of the population for mass survey and treatment, for, owing to the present low incidence, they no longer fear the disease and some Native Authorities do not cooperate in enforcing attendance.

Control of tsetse by vegetation clearance continues, but the rising cost and difficulty of recruiting labour has made urgent the study of alternative methods. Reslashing the enlarging cleared area is becoming difficult to supervise, and it is now proposed that the cleared river systems should be surveyed with a view to dividing them into blocks separated by cleared barriers impassable to tsetse, which will be maintained while regeneration in the blocks will be permitted. The prevention of regrowth of vegetation by the use of plant poisons remains disappointing. Ring-barking was ineffective on riverine trees. DDT spraying of vegetation has been studied. A 5 per cent. suspension in water was partially successful and re-treatment with a 2½ per cent. suspension, applied very thoroughly to those foci where *Glossina palpalis* persisted, cleared fly completely at a cost of £15 per mile. The deposit on leaves will persist for one month in the absence of rain. Benzene hexachloride also was effective against *G. palpalis*. *G. tachinoides* was eliminated from 2 foci by spraying with DDT. Appendices show the detailed results of surveys during the year.

T. H. Davey

Pinto, A. R. da C. Relatório sobre a actividade da Missão de Estudo e Combate da Doença do Sono, na Guiné Portuguesa referente ao Ano de 1954. [**Report on the Activity of the Mission for the Study and Control of Sleeping Sickness in Portuguese Guinea, during 1954**] *Anais Inst. Med. Trop.* Lisbon. 1955, Sept., v. 12, No. 3, 505–35, 1 map.

See this *Bulletin*, 1955, v. 52, 1058.

Fiedler, O. G. H., du Toit, R. & Kluge, E. B. **The Influence of the Tsetse Fly Eradication Campaign on the Breeding Activity of Glossinae and their Parasites in Zululand.** *Onderstepoort J. Vet. Res.* 1954, June, v. 26, No. 3, 389–97, 3 figs.

In this paper the authors present the results of a study of the effect on tsetse pupae and their parasites of a campaign in Zululand with the modern insecticides (DDT & BHC). The tsetse involved was mainly *Glossina pallidipes*, though *G. brevipalpis* was present in some parts of the area. The observations are based on collections of pupae made so that the course of the campaign could be followed and the applications of the insecticides concentrated on those areas where they would be most effective.

These observations show that the application of the insecticides, mostly from aircraft, resulted in a steady decline of the numbers of pupae deposited. No direct effect on the pupae is reported, though the observation that the percentage of pupae producing tsetse also decreased steadily might be interpreted as evidence of some such effect. The authors, however, prefer the explanation that this decline is due to a decreased vigour in pupae produced by tsetse subjected to insecticidal attack. Indeed, the bulk of the evidence elsewhere is against there being any direct effect of these insecticides on tsetse pupae in the soil.

The parasites declined in numbers also. This decline started later than that of the pupae because the application of the insecticides started when few developed parasites were in the air, and at a season when their pupal development was prolonged and emergence thereby much delayed; in spite of this the parasites actually disappeared well before the tsetse did. This was reflected in a slight and temporary increase in the numbers of tsetse pupae hatching, which the authors point out would be most dangerous if the control measures were to be relaxed prematurely. A difference in terrain resulted in a slightly different picture in the two areas where the campaign was conducted. In one, more mountainous, the effect of the insecticides was delayed until helicopters were brought into action to carry the insecticides into the deep mountain ravines where the ordinary type of aircraft was not fully effective. This was reflected in a flattening out of the curve of decline in that area. There was also a complication in the presence of a different species of tsetse (*G. brevipalpis*) associated with the mountain gorges. This delayed effect also had its danger, for even the less effective spraying was enough to reduce the parasites to such a degree as to benefit the tsetse.

The pupal surveys revealed the main parasites of both species of tsetse (*G. pallidipes* and *G. brevipalpis*) in Zululand to be a new species of *Thyridanthrax*, *T. brevifacies*. The following parasites were also recorded, in order of their importance:— *Mutilla auxiliaris*, *Syntomosphyrum glossinae*, *Thyridanthrax abruptus*, and *Trichopria capensis robustior*.

W. H. Potts

GIULIANI, V. Osservazioni sul *Trypanosoma lewisi* (Kent) dei ratti di Aquila. [**Observations on** *Trypanosome lewisi* **in Rats in Aquila, Italy**] *Nuovi Ann. d'Igiene e Microbiol.* 1955, Sept.–Oct., v. 6, No. 5, 374–6. [14 refs.]

The English summary appended to the paper is as follows:—

"By studying the parasitic fauna of the rats in Aquila the author has ascertained the presence of *Trypanosoma lewisi* in 47·2 per cent. of the cases. This may be considered as the highest percentage found in the other investigations carried out in Italy till now."

Citri, N. & Grossowicz, N. **A Partially Defined Culture Medium for *Trypanosoma cruzi* and some other Haemoflagellates.** *J. General Microbiol.* 1955, Oct., v. 13, No. 2, 273–8. [17 refs.]

In a previous note the authors described a liquid medium containing salts, casein hydrolysate, tomato juice, bovine albumin and haematin for culture of *T. cruzi* [*Nature*, 1954, v. 173, 1100]. The above-mentioned medium served as a basis for development of a new partially defined medium the complex composition of which is given in a table. A number of simple growth factors have been used to replace tomato juice, streptomycin and penicillin in small amounts were included as before and the *p*H was 7.8. Growth on the new medium, compared with that on other media, has proved satisfactory during 27 serial passages over a period of 18 months. Growth of 43 strains of other species of the family Trypanosomidae on the partially defined medium was also tried with limited success. Where success has been achieved it appears as if the new medium will serve as a basis for nutritional studies on the organism involved. In an addendum to the paper the authors state that albumin is not essential in the medium for growth of *T. cruzi*.

[In a note in *Trans. Roy. Soc. Trop. Med. & Hyg.*, 1955, v. 49, 603, the authors draw attention to the fact that the medium described above, while supporting the growth of *T. cruzi* and *L. tropica*, failed to support that of *L. infantum*, *L. donovani*, *L. braziliensis* and *L. agamae*. It thus appears that the growth requirements of *L. tropica* differ from those of other leishmanias affecting man, which conflicts with the observations of Kirk and Lewis (this *Bulletin*, 1955, v. 52, 1063) who doubt whether *Leishmania* sp. can be differentiated by cultural, biochemical or serological methods.] *J. D. Fulton*

Taliaferro, W. H. & Pizzi, T. **Connective Tissue Reactions in Normal and Immunized Mice to a Reticulotropic Strain of *Trypanosoma cruzi*.** *J. Infect. Dis.* 1955, May–June, v. 96, No. 3, 199–226, 24 figs. on 5 pls. & 3 text figs. [Numerous refs.]

The authors have used a standardized reticulotropic strain of *Trypanosoma cruzi* in a genetically pure inbred strain (C_3H) of mice [for particulars see this *Bulletin*, 1955, v. 52, 618] for the study of the localization of the parasite in the host's connective tissues and their reaction to the infection. Infections produced in the mice were of 3 types: (1) with the blood trypanosomes, which were virulent, (2) with culture forms, which were of low virulence, producing immunization, and (3) with virulent trypanosomes used to challenge the immunized mice. The infected mice of the three series, as well as normal controls, were killed off at regular intervals, and various tissues (skin, spleen, lymph nodes, bone-marrow, thymus, adrenals, skeletal and heart muscles, lung and

intestine) were fixed with Zenker-formol, and sections and stretch preparations were stained with Maximow's haematoxylin-eosin-azure II.

The results for each kind of tissue and experiment are described in great detail, and illustrated in 5 plates of figures. This study confirmed the reticulotropic nature of the trypanosome strain used, the dividing leishmanial forms of which were commonly found in macrophages, including reticular cells of reticular organs, littoral cells of the liver and adrenals, adventitial cells of the connective tissue, histiocytes of the skin, and inflammatory macrophages in various tissues, as well as in fat cells of the connective tissue. The parasites were not so frequently encountered in fibroblasts, rarer in muscle cells and cartilage, and extremely rarely in bone cells. In non-immune mice, most of the virulent trypanosomes (blood forms) developed normally in free and fixed macrophages, but some were digested in the inflammatory macrophages. In mice infected by cultural forms the development of acquired immunity was manifested by increased phagocytosis and destruction of the parasites by these cells.

The connective tissue reactions to the infection were especially marked in the reticular organs, being manifested chiefly by two opposing processes: (1) the depletion of lymphoid cells, and (2) their regeneration from the cellular reticulum and proliferation by mitotic division. While in the non-immune mice destruction of the parasites was the predominating process, in the immune animals regeneration and multiplication was effected by lymphoid, myeloid and macrophage hyperplasias, thereby providing the immune animals with reserves for the production of macrophages and probably antibodies. Throughout all the tissues there occurred inflammatory processes, which progressed to a fatal end in the non-immune animals, while in the immune ones they were apparently of allergic nature.

This study of a reticulotropic strain of *T. cruzi* has demonstrated the early systemic invasion of the fixed macrophages, as contrasted with the slight invasion of these cells by myotropic strains, which show a predilection for heart and skeletal muscles. *C. A. Hoare*

Pizzi, T. & Rubio, Mafalda. Aspectos celulares de la inmunidad en la enfermedad de Chagas. [**Cellular Aspects of Immunity in Chagas's Disease**] *Bol. Chileno de Parasit.* 1955, Jan.–Mar., v. 10, No. 1, 4–9, 2 figs. [22 refs.] English summary.

The authors discuss the defence mechanism in mice and rats infected with *Trypanosoma cruzi*. The destruction of the parasites was found to be affected by phagocytosis, in which the principal part is played by inflammatory macrophages, which are responsible for both natural and acquired immunity to infection. In this connexion, the inflammation which sets in at the beginning of the infection is regarded as a defence reaction, which should be distinguished from inflammatory processes

which develop in the host later and are allergic in character. The acquisition of immunity brings about a physiological change in the macrophages, which are transformed from host-cells of the parasites to phagocytes destroying the latter. It is thought that this change is due to the production by the macrophages of non-lytic antibodies. In the course of the infection the lymphatic organs undergo marked changes. Thus, new macrophages capable of destroying the parasites by phagocytosis, and plasma cells, which probably elaborate antibodies, are produced. Both these phenomena are instrumental in immunity to Chagas's disease. *C. A. Hoare*

Seneca, H. & Ides, Diane. **The Effect of Oxysteroids on** *Trypanosoma cruzi* **Infection in Mice.** *Amer. J. Trop. Med. & Hyg.* 1955, Sept., v. 4, No. 5, 833–6.

The effect of cortisone on infections with *T. cruzi* in rats and mice has been reported previously [this *Bulletin*, 1952, v. 49, 849, 1033]. The present investigation was undertaken to compare the effect of cortisone and hydrocortisone on infections with *T. cruzi* in mice. Baby mice 4 to 6 weeks old were injected intraperitoneally with approximately 1 million organisms from culture. The drugs in 2·5 mgm. doses were injected every 24 hours or at much longer intervals on a number of occasions. Tail blood of control and treated mice was examined daily and the survival period of each mouse noted. It was found that cortisone and hydrocortisone induced fatal infections whereas a substance, compound S (17-hydroxy-11-desoxycorticosterone), did not. The percentage survival of those treated with cortisone at the end of 2 weeks was lower than that of those treated with hydrocortisone. Compound S protected mice infected with *T. cruzi* against the effects of cortisone under certain conditions. *J. D. Fulton*

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

Brahmachari, P. N., Maiti, C. R. & Kar, C. C. **Agranulocytosis following Antimony Therapy in Kala-Azar.** *J. Indian Med. Ass.* 1955, Oct. 16, v. 25, No. 10, 408–10, 1 fig. [11 refs.]

"A brief review of literature on agranulocytosis in kala-azar is made. "A case of agranulocytosis following treatment with antimony

compounds in a case of kala-azar in a young Bengalee, has been described."

WILLIAMSON, J. **Prophylactic Inactivity of Pentamidine in Experimental Leishmaniasis.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, Sept., v. 49, No. 5, 444–8. [18 refs.]

When an outbreak of kala azar occurred in a district of Kenya [this *Bulletin*, 1953, v. 50, 496] it was thought that pentamidine might serve as a useful prophylactic. Experiments were therefore carried out in hamsters by giving a single intramuscular injection of pentamidine at a dosage level of 50 mgm. per kgm. body weight, and at intervals thereafter the animals were inoculated with one of 3 strains of *L. donovani*, one of which had originated in the Sudan and two others in Kenya. For this purpose suspensions of infected spleen were given at intervals of 1, 2 or 4 weeks after the drug, or flagellate forms of the organism from culture were given 7 and 20 days after the drug. To follow the course of infection in treated and untreated animals the number of parasites present in stained smears of splenic tissue were examined at intervals. The single dose of pentamidine had no prophylactic effect against these infections. At the same dosage level 2-hydroxystilbamidine was also ineffective. A single dose of either drug did not cure established infections.

J. D. Fulton

NERY-GUIMARÃES, F. Estudo de um foco de Leishmaniose muco-cutânea na Baixada Fluminense (Estado do Rio de Janeiro). [**Study of a Focus of Muco-Cutaneous Leishmaniasis in the Lowlands of the State of Rio de Janeiro**] *Mem. Inst. Oswaldo Cruz.* 1955, May, v. 53, No. 1, 1–11, 11 figs. English summary.

The township Surui in the Baixada Fluminense of the State of Rio de Janeiro contains some 30 houses and 100 rustic dwellings, with a population of about 600, Negroes and half-castes, engaged in agricultural pursuits, fishing and the manufacture of charcoal. In the first quarter of 1947 an outbreak of muco-cutaneous leishmaniasis was investigated there. This outbreak quickly followed extensive tree felling for the production of charcoal. Of the 306 persons examined 39 had lesions of leishmaniasis. *Phlebotomus intermedius* was captured both inside and outside the dwellings. From 12 houses 136 specimens were caught. About a third of the cases were of children below the age of 10. Six of the patients were from one house. A description, with 4 photomicrographs, is given of the microscopic findings in 18 biopsies. Three patients recovered without treatment: 16 were treated with tartar emetic; 4 with Fuadin, and 4 with both drugs. The two remedies appeared to be equally efficacious.

In 1953 it was reported that this area was completely free from leishmaniasis, a consummation attributed to periodic spraying of houses with DDT during the intervening years, carried out as a part of a wide-scale anti-malaria campaign. *Norman White*

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

Meira, J. A., Jamra, M. & Lodovici, J. Moléstia de Brill—(recrudescência de tifo epidêmico). [**Brill's Disease**] Reprinted from *Rev. Hosp. Clín.* 1955, July–Aug., v. 10, No. 4, 237–46, 1 graph. [Numerous refs.] English summary.

This is stated to be the first case reported in South America.

Giroud, P. & Ciaccio, G. Adaptation à l'oeuf embryonné d'une souche de typhus entretenue depuis de longues années sur poumon de lapin. Alternance des formes fines et grosses des rickettsies. [**Adaptation to the Egg of a Strain of Typhus Rickettsia maintained in the Rabbit Lung for Several Years. Alternation of Small and Large Forms of Rickettsiae**] *Rev. Belge Path. et Méd. Expér.* 1951, Sept., v. 21, No. 1, 106–7.

Voiculescu, M. & Caruntu, F. Valoarea reacţiilor serologice în diagnosticul tifosului exantematic. [**The Value of Serological Reactions in the Diagnosis of Exanthematic Typhus**] *Viaţa Medicală.* Bucharest. 1955, May, v. 2, No. 5, 35–54, 2 graphs. [32 refs.] French summary.

The Weil-Felix reaction was positive in 66 per cent. and the complement-fixation reaction in 91 per cent. of patients [the number is not stated] under treatment for exanthematic typhus in Bucharest in 1953–54. Positive results were obtained by the two tests in 15·2 per cent. and 33·3 per cent. respectively of a control group of 34 patients suffering from other conditions who had had typhus 8–50 years previously, and in 5 of 55 (9·1 per cent.) and in 1 of 27 (3·7 per cent.) of a similar group of 55 patients who had not had typhus. *D. J. Bauer*

Pondman, A. **On the Preparation of Vaccine against Typhus Fever and the Experiences gathered therewith.** *Rev. Belge Path. et Méd. Expér.* 1951, Nov., v. 21, No. 3, 299–308. [18 refs.]

Tachibana, J. **Weil-Felix Reaction in Experimental Cases inoculated with *Rickettsia tsutsugamushi*, especially its relation to the Administration of Antibiotics.** *Acta Med. et Biologica.* Niigata. 1954, Sept., v. 2, No. 3, 597–608, 6 figs. [15 refs.]

The author has studied the rise and fall of the Weil-Felix reaction (with *Proteus OXK*) in 46 cases of experimental tsutsugamushi disease in which antibiotics were given after 1–2 days of fever, and in 23 cases in which the drugs were given after 3–9 days of fever. In the former group the average height of the titre was considerably less, and the reaction remained positive for a much shorter time, than in the latter group.

The titres observed in some of the patients of the two groups 203–270 days after inoculation were as follows:—

of 15 patients treated after 1–2 days' fever, 5 were negative, 10 were 1 in 20 to 1 in 80;

of 10 patients treated after 3–9 days' fever, 0 was negative, 6 were 1 in 20 to 1 in 80 and 4 were 1 in 160.

Comparing the findings with the published records of reactions found in untreated patients it was concluded that there was a direct relationship between the duration of the fever and the height and duration of the reaction. The author regards the reaction as indicating immunity and states that " this fact implies that the formation of immune body is not carried out satisfactorily when fever is immediately removed by the administration of antibiotics ".

The author states that he has been guided in this study by Professor Katsura who has briefly discussed the subject in his paper on the chemotherapy of tsutsugamushi disease [see below], but does not suggest that the agglutinins concerned in the Weil-Felix reaction are immunizing antibodies. *John W. D. Megaw*

Katsura, S. **On the Chemotherapy of Tsutsugamushi Disease.** *Acta Med. et Biologica.* Niigata. 1954, Dec., v. 2, No. 4, 725–53, 22 figs. [56 refs.]

The author describes a very interesting series of experimental studies of the chemotherapy of tsutsugamushi disease. The chief purpose of the investigation was to discover improved methods of treatment with the broad-spectrum antibiotics, especially the following:—chloramphenicol = Chloromycetin (CA); chlortetracycline = Aureomycin (AM); oxytetracycline = Terramycin (TM); erythromycin = Ilotycin = Erythrocin (EM); tetracycline = achromycin (ACM) and carbomycin = Magnamycin (MM). The author has already described his experiences in the treatment of naturally occurring cases of the disease, and of 19 patients inoculated for therapeutic purposes [see this *Bulletin*, 1955, v. 52, 1181]. In the present paper an analysis of the effect of treatment is presented in

a table dealing with 152 cases of natural infection or resulting from inoculation; a shortened version of this is given below.

Treatment started Total dose (gm.)	Days 1–3 Relapses	Days 4–6 Relapses	Days 7–13 Relapses	Total Total relapses
0·5–2·0	30 of 33	3 of 5	1 of 5	34 of 43
2·1–3·0	20 of 37	6 of 14	3 of 10	29 of 61
3·1–4·0	5 of 13	1 of 6	0 of 2	6 of 21
4·1–12·0	1 of 14	0 of 5	0 of 8	1 of 27
Total	56 of 97	10 of 30	4 of 25	70 of 152

The drugs used were AM; TM; CA; EM; or MM. Nearly half of the patients were treated with AM which was regarded as the most effective drug. The general trend of the results obtained was the same as with the others; the earlier the treatment was started the higher was the relapse rate, and the larger the dose the fewer were the relapses.

In a series of experiments on the prolongation of life of inoculated mice treated by antibiotics AM was found the most effective; TM and ACM were also very effective, but CA, EM and MM were considerably weaker.

A special effort was made to discover a dosage system which would prevent relapse without exceeding a total dosage of 3·0 gm. More than 30 temperature charts, which illustrate the results of experiments on patients inoculated with *R. tsutsugamushi*, show that a total dosage of 2·5–3·5 gm. of AM or TM, starting within the first 3 days and spread over 5–10 days in gradually diminishing daily amounts, was adequate to cause gradual subsidence of the fever without relapse. Even with doses of 1·0 to 2·0 gm. the results seemed satisfactory [but the fall in temperature was so slow in some of the patients treated with the smaller of these doses that it might be doubted whether the drug had produced any pronounced effect.] No mention is made of the effect on the general condition of the patients who were receiving such doses as 50–100 mgm. twice daily over periods of 10–14 days; presumably this was satisfactory. With CA, EM, and MM total doses of about 5·0 gm. or more seemed to be necessary. Only 2 cases were treated with ACM but in both of these good results were obtained with total doses of 0·8 gm. and the author gained the impression that " ACM had a fairly strong therapeutic effect ".

These experiments make a valuable contribution to the solution of the difficult problem of dosage of the antibiotics in tsutsugamushi disease. [But workers in the field cannot expect the results to be of general application to cases of natural infection, which vary greatly in virulence and are seldom available for treatment within the first 3–4 days. In many cases the chief anxiety of the physician will be to save the life of the patient and to avoid serious damage by the rickettsiae rather than to prevent a relapse, which is nearly always easy to control. The author himself has found that much smaller total doses are needed to cure

relapses in naturally occurring cases than to cure the original attacks. The chief point that seems to be confirmed by the author is that the antibiotics do not act as a " therapia magna sterilisans "; their real function is to protect the body from risk of death or damage while nature is bringing about a cure and immunity against further attack.]

Reference is made to the inhibiting effect of the antibiotics on the development of *Proteus OXK* agglutinins and to the changes in the opsonic index for *Pr. OXK* and a strain of *Staphylococcus*. Special studies of these subjects have been made by workers under the guidance of the author [see TACHIBANA, above, and NOSE and TAZAWA, below].

[Workers on the chemotherapy of tsutsugamushi disease and other rickettsial diseases should read this paper; they will find much material of interest.] *John W. D. Megaw*

NOSE, H. & TAZAWA, K. **The Changes in Opsonin Indices (by *Staphylococcus aureus* Terashima Strain) in inoculated Cases of Tsutsugamushi Disease.** *Acta Med. et Biologica.* Niigata. 1954, Dec., v. 2, No. 4, 791–800, 4 figs.

The authors tabulate and discuss the results of 380 estimates of the opsonic indices observed in 40 cases of experimental tsutsugamushi disease in which the treatment by broad-spectrum antibiotics was being tested. They recognize that the tests should properly have been made with *Rickettsia tsutsugamushi* but as this was practically impossible they substituted a strain of *Staphylococcus aureus* and claim that the results " . . . may be considered to have no great difference from the determinations " with the causative organism and seem " . . . to be suggestive regarding the significance of opsonin ".

The findings are tabulated according to the stage of the experiment beginning with the day before inoculation and ending with the 3rd day after defervescence. The average index for 19 groups, each consisting of 2–31 patients tested at different stages, ranged between 0·95 and 1·22 in all except 2 groups, one of which consisted of 5 patients with high fever who were tested on the 3rd day of antibiotic treatment and had an average index of 1·74 with a range of 1·38–2·53; the other exception was a group of 2 patients having high fever on the 4th day of treatment when the average index was 1·29 with a range of 1·07–1·50. A group of 6 patients with low fever tested on the 3rd day of treatment, and another group of 3 with low fever tested on the 4th day of treatment, had average indices of 1·07 and 1·09, respectively.

The authors acknowledge that they were guided in this study by Professor KATSURA who in his paper on the chemotherapy of tsutsugamushi disease refers to his own work on the subject [see above]. He used *Proteus OXK* as well as *Staphylococcus* and found that " generally speaking, phagocytic activity in this disease was not observed to react promptly to antibiotics ". *John W. D. Megaw*

Hayashi, H. Über die intrazerebrale Inokulation des Erregers der Tsutsugamushi Krankheit zu Mäuse. [**Intracerebral Inoculation of Mice with** *Rickettsia tsutsugamushi*] *Kitasato Arch. Exper. Med.* 1954, Sept., v. 27, No. 3, 63–76, 5 figs. [15 refs.]

By an extensive series of experiments the author has satisfied himself that intracerebral inoculation of mice is in many respects the most satisfactory method of serial transmission of *Rickettsia tsutsugamushi.*

With 3 strains of the organism which had been maintained in the laboratory for long periods it was found that repeated transmission from brain to brain did not produce any change in the characteristics of the strains, including their pathogenicity.

Smaller doses of the inoculum were needed than for intraperitoneal inoculation, the risk of contamination by secondary infection with intestinal organisms was avoided and the histological changes in the brain and meninges indicated the rickettsial nature of the infection at an early stage so that the identification of the organism was possible sooner than with the customary method.

With the same rickettsial suspension and injecting doses 10 times greater by the intraperitoneal than by the intracerebral route the average survival time of mice inoculated by the latter route was rather longer than by the former.

A detailed description is given of the effects of intracerebral injections on mice and of the histopathology of the brain of the animals when examined at different intervals of time after inoculation.

John W. D. Megaw

Wentworth, Berttina B. **Historical Review of the Literature on Q Fever.** *Bact. Reviews.* 1955, Sept., v. 19, No. 3, 129–49, 2 figs. [123 refs.]

Chumakov, M. P. [**Queensland Fever—a Zoonotic Rickettsiosis of Man and Animals**] *Veterinariya.* Moscow. 1954, v. 31, No. 9, 26–32. [In Russian.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1955, Oct., v. 43, Pt. 10, 147.]

The distribution of Q fever, caused by *Coxiella* (*Rickettsia*) *burneti*, its effects in man and domestic animals, and the ways in which it may be transmitted are reviewed from the literature, and records are given of its occurrence in man in the Soviet Union, where it appears to be endemic in various parts of Central Asia. The rickettsiae have also been isolated there from *Hyalomma excavatum* Koch (*anatolicum* Koch), *Argas persicus* (Oken) and mites of the genera *Leeuwenhoekia* and *Dermanyssus*, but it is believed that infection is usually acquired by

inhalation of infected dust and not from tick bites, though the dried faeces of the ticks or the dried remains of dead ticks may be an important factor in dust infection. Small temporary outbreaks of the disease have occurred in the European part of the Soviet Union among workers in factories handling cotton brought from the endemic area in Central Asia.

Craddock, A. L. & Gear, J. **Q Fever in Nakuru, Kenya.** *Lancet.* 1955, Dec. 3, 1167–9, 1 chart.

The findings described in this paper add Kenya to the long list of countries in which Q fever is endemic. The disease was detected in Nakuru, a large market town 100 miles north-west of Nairobi, in a dairy-farming area. During the previous 2 years 9 clinically typical cases were confirmed by complement-fixation tests with titres ranging from 1 in 100 to 1 in 800. In 4 other typical cases with titres of 1 in 40 to less than 1 in 100 the diagnosis was probable. Characteristic clinical features were the occurrence of frequent rigors with drenching sweats, often three times in 24 hours, and intense headache. Cough was usual, often with blood-stained sputum. There was relative bradycardia in most cases.

The drug of choice was chlortetracycline (aureomycin); the response to this was sometimes dramatic; an initial dose of 0·50 gm. followed by doses of 0·25 gm. every 8 hours to make a total dose of 4·0 gm. was usually sufficient.

One of the authors (J. Gear) has already shown that Q fever is the most common of the rickettsial diseases in southern Africa, the others being epidemic and murine typhus and tick bite fever (the local variety of tick typhus). Gear has also shown that most of the cases among adults in southern Africa are seen in newcomers from north-west Europe; the indigenous population appear to have been immunized by attacks in childhood. It is suggested that the epidemiology of the disease in Kenya is the same as in southern Africa. In both of these areas the disease is associated with the presence of tick-infested cattle and sheep; infection seems to be transmitted to man chiefly by the inhalation of infected dust originating from dried discharges from these animals.

Special attention should be given to this paper by medical men working in areas from which Q fever has not yet been reported.

John W. D. Megaw

Victor, J., Mika, L. A. & Goodlow, R. J. **Studies on Mixed Infections. II. Pathological Effects of Combined** *Brucella suis* **and** *Coxiella burnetii* **Infection.** *Arch. Pathology.* 1955, Sept., v. 60, No. 3, 240–50, 27 figs.

This is an extension of earlier work [this *Bulletin*, 1955, v. 52, 623] which showed that guineapigs simultaneously infected with *Brucella suis*

and *Rickettsia burneti* developed a less severe infection than animals receiving the same dosages separately. A detailed description, with numerous photomicrographs, is given of the gross lesions and histological appearances in animals infected with aerosol dosages of 5000 *Br. suis* and 86 ID 50 *R. burneti* separately and combined. Animals were killed at different times from the 4th day to the 8th month. In the combined infection there was less enlargement of the lymphatic glands and spleen, but the lesions were observed earlier than in the single infection. The lungs showed the changes characteristic of both infections and the lesions were not modified in extent in animals simultaneously infected with both organisms.

Discussing possible reasons for the decreased severity of the combined infections, the authors note that an interference phenomenon is unlikely to be the explanation. There was much normal tissue between the lesions, so that competition for " infection sites " did not seem to be a factor. The observations show that the severity of some infections may be modified not only by previous infection by the same or a related agent but also by other unrelated infections. The mechanism is obscure, but the possibility must be borne in mind when inconsistencies in infection rates in groups of animals are observed in experimental work.

J. C. Cruickshank

BARTONELLOSIS

Peters, D. & Wigand, R. **Bartonellaceae.** *Bact. Reviews.* 1955, Sept., v. 19, No. 3, 150–59, 9 figs. on 4 pls. [48 refs.]

Bartonella bacilliformis, a human pathogen causing Oroya fever, has characters typical of a bacterium; the rod-shaped cells are motile by polar flagella, they divide by binary fission and can be grown on artificial media. The authors are much less certain of the systematic position of the animal bartonellas; they are doubtful whether two genera are justified for *Haemobartonella muris* and *Eperythrozoon coccoides*, which, they think, should be excluded from the bacteria. The paper includes a table of characters of the " Bartonellacea ".

S. T. Cowan

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

Cambournac, F. J. C. & Gândara, A. F. Inquérito sobre febre amarela em S. Tomé e Príncipe. [**Survey of Yellow Fever in São Tomé and Principe, Guinea**] *Anais Inst. Med. Trop.* Lisbon. 1955, Sept., v. 12, No. 3, 293–9, 1 map.

The English summary appended to the paper is as follows:—

"Neutralization tests in mice against yellow fever virus were performed in 295 blood sera collected in children under the age of 15 years. All of these had been born in S. Tomé and Principe islands and were living there. There were no positive results.

"The disagreement is pointed out of the results obtained in 1934 by a Rockefeller Foundation survey in which amongst 15 samples 4 positive sera were found. Those sera belonged to individuals with ages between 18 and 15 years.

"In view of the climatic conditions—equatorial climate—as well as the existence of *Aëdes* in quantity if yellow fever virus existed there, surely some positive sera should be found amongst the 295 sera examined now.

"The 4 positive sera found in 1934 are supposed to be of labourers who might have come from other overseas territories where they had got the infection or even that they have been vaccinated before.

"For this reason the authors believe that yellow fever virus does not exist in S. Tomé and Principe islands."

Downs, W. G., Aitken, T. H. G. & Anderson, C. R. **Activities of the Trinidad Regional Virus Laboratory in 1953 and 1954 with special reference to the Yellow Fever Outbreak in Trinidad, B.W.I.** *Amer. J. Trop. Med. & Hyg.* 1955, Sept., v. 4, No. 5, 837–43, 2 maps.

Since its establishment at Port-of-Spain early in 1953 the Trinidad Regional Virus Laboratory has been concerned with investigating the occurrence of viral activity—particularly of the arthropod-borne encephalitis viruses—in the human, animal and arthropod populations of the island territory. Its investigations into the activity of the yellow-fever virus in Trinidad form the subject of the present report.

In that island, where since 1914 no human case of yellow fever had been encountered, a sharp outbreak of the disease occurred in 1954. Between April and October there were 15 human cases, from 14 of which yellow-fever virus was isolated—once on the 12th day of disease; 4 of the cases proved fatal. Soon after the first human case had been diagnosed it was found that monkeys in the forests were dying in large

numbers, and during the period July 1954 to January 1955 yellow fever virus was isolated from the livers of 7 red howler monkeys (*Alouatta seniculus insulanus*) brought to the laboratory by hunters. Moreover, neutralization tests performed on the sera of 73 monkeys collected from various forested regions showed that 19 of 61 *Alouatta* sera and 7 of 12 *Cebus apella* sera contained protective antibody. From mosquitoes, collected during August and September in the Melajo and Charuma Forests and then pooled, yellow fever virus was also recovered: 21 times from pools of *Haemagogus spegazzinii* and once from a mixed pool containing 17 different species. In this investigation virus was repeatedly recovered from *Haemagogus* mosquitoes captured at ground level.

Although no virus was isolated from *Aëdes aegypti*, even when captured in houses with confirmed yellow fever cases, at least 3 of the human cases, including one from urban Port-of-Spain, would, on epidemiological grounds, appear to have derived their infection from this mosquito. The remaining infections were probably all acquired in the forest; nevertheless the wide distribution of *Aëdes aegypti* throughout the island, with *aegypti* indices in rural houses of 70 per cent. or more, suggests that in some of the cases seen among forest workers the infection may have been transmitted by *Aëdes aegypti*.

Whether yellow fever has been present in Trinidad continuously since 1913–1914 or has been reintroduced sporadically from the neighbouring South American continent is a matter for speculation. Evidence in support of the latter hypothesis may be summarized as follows: (a) neutralization tests carried out in 1953 on 694 serum specimens from east-central Trinidad showed, in addition to a high percentage of immunes in older people, 8 immunes among 100 young people between 15 and 20 years of age and no immunes among 134 children below the age of 15 years; (b) in the recent outbreak of yellow fever in Venezuela which began in 1953 and was centred in the eastern states nearest to Trinidad, human cases antedated the first Trinidad case of April 1954; and (c) until 1954 no yellow fever epizootic among monkeys had been observed since the mid-1930's.

[In an immunity survey made in 1932 in 4 urban areas of Trinidad 2 immunes were found among 26 persons over 15 years of age and none was present among 158 in the age-group 0–14 years.] *G. Stuart*

Downs, W. G., Anderson, C. R. & Spence, L. **Isolation of Yellow Fever Virus from a Human Patient on the Twelfth Day of Illness.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, Nov., v. 49, No. 6, 577–9.

During the yellow fever outbreak in Trinidad in 1954, the specific virus was isolated from one patient on the 12th day of illness [see above].

The authors now give a clinical account of the case and a description of the methods used to isolate the virus. The patient had worked on an

estate not far from a forest inhabited by red howler monkeys and he had not been immunized against yellow fever. When the usual laboratory investigations failed to indicate the cause of his severe febrile illness, a provisional diagnosis of yellow fever was made. Serum from blood taken on the 12th day of illness, 271 hours after onset, was inoculated into 2-day-old Swiss mice and yellow fever virus was isolated. This was repeated in 2-day-old and adult mice on a portion of the serum which had been stored at −60°C. for about 2 months and virus was isolated from both groups. The results in the adult mice suggested that the amount of virus present was small.

Additional blood specimens were taken about 1 and 5 1/2 months after the first one: neutralization tests suggested a very poor immune response. The authors refer to the findings of Berry and Kitchen [this *Bulletin*, 1932, v. 29, 571] that virus can be isolated in the presence of neutralizing antibody. In the present case, the diagnosis could not have been made on the basis of the neutralization tests alone.

The literature is briefly reviewed and it is clear that isolation of yellow fever virus from a patient's blood after the 6th day of illness is uncommon. It is, however, of interest to note that Southam and Moore [*Bull. Hyg.*, 1954, v. 29, 891] isolated one of the more recently described neurotropic agents, Egypt 101, from a patient's blood 28 days after intramuscular inoculation of the virus as an experimental therapeutic measure in advanced cancer. *H. J. O'D. Burke-Gaffney*

Anderson, C. R. & Wattley, G. H. **The Isolation of Yellow Fever Virus from Human Liver obtained at Autopsy.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, Nov., v. 49, No. 6, 580–81.

During the yellow fever outbreak referred to above, 4 fatal cases of yellow fever were diagnosed from histopathological examination of the liver. In 3 cases, which are briefly described, liver suspensions were inoculated into white mice and yellow fever virus isolated from each.

The livers were ground in a mortar with alundum and a 20 per cent. suspension made in normal saline. After low-speed centrifugation, the supernatant was inoculated intracerebrally into white mice. The virus was identified by the neutralization test.

The interest of these findings lies in the correlation of the virus isolation with the independent pathological diagnosis. The authors are unaware of previous isolation of yellow fever virus from human livers [though during the epidemic period, the senior author with Downs isolated it from the livers of 7 red howler monkeys: see this *Bulletin*, 1955, v. 52, 1184, and above].

They urge that more attempts should be made to isolate virus from human subjects. *H. J. O'D. Burke-Gaffney*

RABIES

Fernández Urtiaga, L. & Lorenz, R. Encefalomielitis post-vacunación antirrábica. [**Encephalomyelitis following Anti-Rabies Vaccination**] *Lumen*. Havana. 1955, June, v. 12, No. 1, 1–5.

The following is a translation of the authors' summary:—

A case is presented of encephalomyelitis following antirabies vaccination in a child of 7, in which treatment with cortisone and immune serum caused a rapid regression of all the manifestations, with no sequelae whatever. *H. J. O'D. Burke-Gaffney*

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

Ajl, S. J., Reedal, Jeanette S., Durrum, E. L. & Warren, J. **Studies on Plague. I. Purification and Properties of the Toxin of** *Pasteurella pestis*. *J. Bacteriology*. 1955, Aug., v. 70, No. 2, 158–69, 8 figs. [18 refs.]

This is the latest, though probably not the last, word on the isolation in pure form of the endotoxin of *Pasteurella pestis*. The first step in the processes described was to obtain large amounts of the bacillary cells of the avirulent Tjiwidej strain of *P. pestis* in broth culture. An avirulent strain was chosen for convenience because such strains yield as potent a toxin as do the virulent strains. The cells were sedimented by centrifugation, washed twice with distilled water and resuspended in a small quantity of water, then mixed with 4 volumes of acetone and cooled to −70°C. in a dry-ice bath and allowed to stand for 30–60 minutes, after which the cell mass was collected by filtration or centrifugation and resuspended in 4 volumes of chilled acetone. This procedure was repeated 3 times, after which the remaining acetone was evaporated *in vacuo*. The toxicity of the cell mass was tested by intraperitoneal inoculation of mice.

The steps in purification were:—(1) Extraction of the toxin from the dried cells by a 2·5 per cent. solution of sodium chloride; (2) precipitation and concentration of the toxin with ammonium sulphate (0·2–0·6 saturation); (3) isoelectric precipitation at *p*H 4·7 for partial separation of the toxin from envelope substance; (4) precipitation with manganese chloride to remove nucleic acid; (5) precipitation with methyl alcohol to concentrate protein and remove extraneous materials; (6) calcium phosphate gel absorption and elution for the further separation of envelope substance;

(7) extraction with chloroform to remove lipoid materials; (8) final concentration of the toxin and removal of extraneous material by isoelectric and ammonium sulphate precipitation.

The final purification was by continuous paper electrophoresis, a procedure which had not hitherto been applied to the purification of bacterial toxins. An illustrated description of the method will be found in the paper. Each stage in the purification involves a fall in the yield of the toxic fraction, which in the experiment described fell from 4,835 mgm. to 115 mgm. The LD 50 for mice by the intraperitoneal route was reduced from an initial amount of 18·0 μgm. to 2·6 μgm.

By chemical analysis the toxin was found completely free from nucleoproteins, carbohydrate and capsular material; it contained 14 per cent. nitrogen, 1·9 per cent. sulphur and not more than 0·2 per cent. phosphorus. It was antigenic, producing a specific antitoxin when injected into rabbits. *J. Megaw*

Warren, J., Walz, Ursula, Reedal, Jeanette S. & Ajl, S. J. **Studies on Plague. II. Immunological Properties of Purified** *Pasteurella pestis* **Toxin.** *J. Bacteriology.* 1955, Aug., v. 70, No. 2, 170–76.

In this description of a study of the highly purified plague toxins referred to in the preceding abstract the authors state that the rôle played by the toxin of *Pasteurella pestis* in immunity against plague has hitherto been largely conjectural. They have now shown that rabbits inoculated with suitable doses of the pure toxin and given booster doses yield serum which compares favourably with the Lederle concentrated antiplague rabbit serum when tested by neutralization, haemagglutination and complement-fixation tests. The antitoxic serum showed the following properties:—It did not react with envelope antigen and therefore was shown to have been effectively freed from that substance. It neutralized toxin extracted from several strains of *P. pestis* some of which were virulent and others were avirulent, so it appeared that all these toxins had similar antigenic structures. This view was confirmed by finding that the purified toxin reacted with antisera prepared against a variety of virulent and avirulent strains of *P. pestis*. These findings suggest that it may be possible in future studies to establish whether antitoxic immunity alone will modify the course of plague in experimental animals. This has hitherto been impossible because neither purified toxin nor specific antiserum has been available. The specific antitoxic serum was found suitable for use in estimating the concentration of toxic antigen contained in *P. pestis* cultures, toxoids etc.

The purified toxin was found specially useful in the diagnosis of human plague by the haemagglutination test; erythrocytes treated with tannic acid and sensitized with the toxin were agglutinated at much higher titres than were given by the complement-fixation test. This method was

equally useful for quantitative estimates of plague antitoxin in immune sera in general. *J. Megaw*

Ransom, J. P., Quan, S. F., Omi, G. & Hoggan, M. D. **The Role of Serum Proteins in Gel-Precipitin Patterns of** *Pasteurella pestis*. *J. Immunology*. 1955, Oct., v. 75, No. 4, 265–8, 2 figs. [13 refs.]

" While studying diffusion of two separate complex antigenic mixtures (*Pasteurella pestis* suspensions) in parallel directions, the authors noted retardation of diffusion of antigenic components when organisms were suspended in normal rabbit serum or albumin fractionated from normal rabbit serum. This observation served to explain some of the aberrant results obtained when normal rabbit serum was used as a suspending agent for external reactant in the simple linear diffusion technic of Oudin.

" The conclusion was reached that rabbit serum albumin has a combining affinity for *P. pestis* antigens, and probably other antigens."

Brygoo, E. R. & Courdurier, J. Action *in vitro* des antibiotiques sur 101 souches malgaches de *Pasteurella pestis*. [**Action** *in vitro* **of Antibiotics on 101 Madagascar Strains of** *Pasteurella pestis*] *Ann. Inst. Pasteur*. 1955, July, v. 89, No. 1, 118–21.

By means of sensitivity discs 107 cultures of *Pasteurella pestis*, 101 isolated in Madagascar and 6 isolated elsewhere, and 6 cultures of *Pasteurella pseudotuberculosis*, were tested for their sensitivity to the following antibiotics: bacitracin, erythromycin, penicillin, tetracycline, Aureomycin, oxytetracycline, framycetin, neomycin, streptomycin, chloramphenicol and polymyxin B. For sensitivity tests 10 drops of a 48-hour culture in Martin's broth were added to 10 ml. melted Martin's agar at 45°C. and the mixture was poured into Petri dishes, which were then incubated for 48 hours.

Erythromycin, bacitracin and polymyxin B were almost completely inactive against all strains. The most active compounds were chloramphenicol, Aureomycin (except for 2 strains of *P. pestis*), oxytetracycline, streptomycin and neomycin, but even with these antibiotics the width of the inhibition zone was in most cases less than 5 mm.

Mary Barber

Anchezar, B. V., Miravet de Issaly, I. S. & Issaly, A. S. Acción de la hidrazida del ácido isonicotínico en peste experimental. [**Action of Isoniazid in Experimental Plague**] *Rev. Inst. Malbrán*. Buenos Aires. 1954, v. 16, No. 1, 71–8. [44 refs.]

In view of the known value of isoniazid in the treatment of tuberculosis the authors decided to test the drug *in vitro* and *in vivo* in experimental

guineapigs inoculated with plague. They showed in a conclusive manner the inefficacy of the drug in experimental infection of guineapigs and the *in vitro* tests showed that the inhibitory effect on *Pasteurella pestis* was very slight.

In their review of the reports in the literature of the action of the drug in leprosy the authors quote Lowe among other authors as expressing optimistic opinions on its value, but a reference to this *Bulletin*, 1953, v. 50, 127, does not support this statement; while admitting that it might be of slight value in leprosy, Lowe went on to state that the results in 7 patients whose treatment with other drugs had produced complications were no better than those obtained simply by stopping treatment.

J. Megaw

Hoessly, G. F., Walker, D. L., Larson, A. & Meyer, K. F. **Experimental Bubonic Plague in Monkeys. I. Study of the Development of the Disease and the Peripheral Circulatory Failure.** *Acta Tropica.* Basle. 1955, v. 12, No. 3, 240–51, 5 figs. [11 refs.]

Fifteen monkeys (*Macacus rhesus*) were inoculated subcutaneously in the lower part of the abdomen with a virulent strain of *Pasteurella pestis*. The resulting attacks of plague were closely studied in every practicable way, including even the preparation of frequent electrocardiographic tracings and blood-pressure measurements. Local oedema appeared at the site of inoculation within 6–10 hours; the temperature began to rise within 12–24 hours. The monkeys remained vigorous till the 3rd day when they became lethargic and weak. The temperature was continuously high till 6–10 hours before death when it fell to subnormal. Most of the monkeys died on the 4th day after inoculation; 1 died in 65 hours and 1 on the 6th day. Only 1 survived. There was a continuous fall in the systolic and diastolic blood pressure; the fall became steep after 24 hours and soon the pressure could no longer be measured. After 48 hours the condition was one of pronounced peripheral vascular failure. The pulse was only slightly accelerated; the respiration was rapid and shallow. Electrocardiograms showed no changes that would suggest myocarditis. *P. pestis* could always be recovered from the blood after 36 hours; and shortly before death bacilli could often be seen in blood films. The only monkey that recovered remained free from bacteraemia though 10 attempts were made to obtain cultures; in other respects its illness was typically very severe.

Within 24 hours there was a pronounced polymorphonuclear leucocytosis. There was little change in the erythrocyte count or in the haemoglobin, haematocrit and plasma-protein values. The most striking feature was the pronounced circulatory failure; the authors suggest that the descriptions of plague in man indicate that this condition occurs more frequently in plague than in other bacterial infections; they conclude that the most probable cause of the circulatory failure is the direct action of

the toxic elements on the peripheral blood vessels; damage to the heart or vasomotor centre being relatively unimportant. They admit, however, that the features of rapid, and often irregular, pulse which were absent among the experimental monkeys have been usual in severe attacks of human plague; they think that for this reason further study of the problem is desirable. *John W. D. Megaw*

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Pollitzer, R. **Cholera Studies. 5. Bacteriophage Investigations.** *Bull. World Health Organization.* Geneva. 1955, v. 13, No. 1, 1–25. [Numerous refs.]

After a preliminary survey of the earlier observations by d'Hérelle and others on cholera bacteriophage an account is given of later work on the subject including the important period of investigation in India from 1927 onwards by Asheshov, Morison, Pasricha and others and of the further related studies by Bruce White. In India a series of bacteriophages, designated A-M, were isolated from stools and water and their characteristics were investigated. The strains differed in their rapidity and range of action and in their potency. A form of special importance was cholerophage A which was found to act only on smooth strains of *V. cholerae* and El Tor vibrios, lysis being followed by the appearance of rough secondary growth resistant to the A-type phage. Bruce White found this phage to cause lysis of all Ogawa strains tested but not all Inaba strains. Chinese and Japanese strains examined were not lysed except on the addition of lysozyme. Pasricha found the quick-acting A-type phage to be widely distributed in Calcutta waters during the cholera season but rare in the non-cholera season.

Another strain of special interest was that designated LL-type by Bruce White who found it to be the most frequently occurring of Indian cholera phages, the majority of Indian strains of *V. cholerae* being LL-lysogenic. Chinese and Japanese strains of the vibrio were found to be LL-free and LL-sensitive. In contrast with *V. cholerae* which had been shown to be usually either infected with LL-type phage or sensitive to it, El Tor and non-cholera strains did not show these conditions. Although LL-phage did not lyse rough LL-free strains of *V. cholerae* the phage could multiply on the rough cultures which like smooth cultures became lysogenic.

The other phages of the Indian series were slower in their action and

less potent than A-type phage. Their action was not limited to smooth *V. cholerae* and they acted in varying degree on smooth and rough cultures and on non-cholera vibrios.

It was shown that A-type phage was selectively inactivated by the specific polysaccharide of smooth *V. cholerae* on El Tor vibrios while the polysaccharides of rough *V. cholerae* or non-cholera vibrios had no such effect. From this Bruce White concluded that the resistance of rough secondary growths to lysis was due to loss of susceptible substance rather than to any positive modification or " immunity ". Maitra claimed that by applying combined phage-inhibition tests with precipitin tests made with sera raised against strains falling into different groups the results of such tests enables vibrios to be divided into two groups, namely, one consisting of typical, smooth cholera vibrios and El Tor vibrios and the other comprising atypical and rough strains and cholera-like vibrios.

The question of bacteriophage-produced vibrio variation is dealt with at some length. The production of a characteristic rough form of *V. cholerae* by phage action identical with that produced by other means is recognized, this being due to loss of smooth somatic antigen. The loss after the action by B- and C-type phages for example is, however, incomplete. By subsequent daily subculture the original properties of the strain may be restored. It has been observed that cholera strains submitted to phage action may show a slight tendency to become haemolytic but this property is weak and unstable. The claim of Doorenbos that cholera strains had been transmuted to the El Tor form by such action is not accepted.

The question has been raised whether a proportion of the vibrios inagglutinable by cholera high-titre serum which are isolated in cholera-affected areas, are mutant forms of *V. cholerae* produced by phage action and whether such forms play a part in the epidemiology of cholera. The results of studies on the point are presented at some length and certain possible fallacies in observations are pointed out. The author indicates that the matter will be discussed in a later section of the Memoir.

Mention is made of tests of the value of cholera-phage lysates for prophylactic inoculation and of the addition of lysates to the standard cholera vaccine. The procedures did not appear to offer any special advantages.

John Taylor

Dudani, A. T. **Use of Guinea-Pig Serum for Identification of Rough Strains of** *Vibrio cholerae*. *Indian J. Med. Res.* 1955, July, v. 43, No. 3, 379–82.

Fifty-one strains of *Vibrio cholerae* were tested for roughness by the guineapig serum vibriocidal test described by Gurkirpal Singh and Ahuja [this *Bulletin*, 1952, v. 49, 949]. The results, given in a table, show that the guineapig serum killed only those strains which had a

rough element. All 27 strains which agglutinated with a rough monospecific serum failed to grow while growth occurred with all the 24 strains which were inagglutinable with the rough serum. Thirteen of the strains which were agglutinated with the rough serum had smooth components in that 4 were agglutinated by Inaba monospecific serum (1 to full titre), 7 were agglutinated by Ogawa monospecific serum (1 to full titre), and 2 by both Inaba and Ogawa sera.

The author discusses the discrepancies obtained by Gallut with this test [*ibid.*, 1953, v. 50, 704] and considers that all 3 " rough " cultures used by him were serologically smooth-rough strains since they were agglutinated by Inaba and Ogawa sera and the growth after contact was smooth in character. It is important that the guineapig serum should be tested before use and shown to be bactericidal for a known rough strain and non-bactericidal for a known smooth strain. *C. C. B. Gilmour*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Bucco, G. & Chieffi, G. Sulle varietà morfologiche di *Entamoeba histolytica*. III. Diametro e potere patogeno. [**Morphological Varieties of *Entamoeba histolytica*. III. Diameter and Pathogenicity**] *Riv. di Parassit.* Rome. 1955, Apr., v. 16, No. 2, 65–71, 3 figs. [20 refs.] English summary (6 lines).

In two previous papers on size variation in *Entamoeba histolytica* [this *Bulletin*, 1956, v. 53, 52, 53] the authors concluded that such variants were not races but represented merely strains. Since the pathogenicity of the large strain is established beyond all doubt, in the present paper the authors deal only with the pathogenicity of the small strain. After reviewing the literature on this question they pass to their own observations, which were based on 26 patients harbouring the small strain of parasite. These cases manifested various clinical symptoms, including gastro-intestinal disturbances (*e.g.* diarrhoea), of amoebiasis, which the authors attribute to the small amoebae. The virulence of 7 strains of these amoebae was tested by intracaecal inoculation of the human parasites into 21 guineapigs, 16 of which survived the operation and were killed from 4 to 15 days after inoculation, when the large bowel was fixed for sections and its contents were examined for amoebae. Positive results were obtained with 2 of the human strains in 3 animals,

whose caeca and ascending colons showed numerous small ulcers (2–3 mm.), while small amoebae, measuring 8–11 μ in diameter, were found both in the lesions and faeces.

It is concluded that both the clinical picture of the human infections and the results of experimental infections provided evidence of the pathogenicity of the small strain of *E. histolytica*. The authors point out that the proportion of cases of infection with the small strain is higher in countries with a temperate climate (*e.g.* 37·7 per cent. in Italy) than in the tropics (*e.g.* 7·2 per cent. in Ethiopia [this *Bulletin*, 1953, v. 50, 512]), a fact which they correlate with the more common occurrence of amoebic dysentery produced in tropical countries by the large strain, and suggest that the dimensions of *E. histolytica* may vary according to the conditions of host-parasite relationship under which it developed.

C. A. Hoare

Nelson, E. C. & Jones, Muriel M. **Some Factors related to** *Entamoeba histolytica* **Growth on Rice Products in a Simple Medium.** *Amer. J. Trop. Med. & Hyg.* 1955, Sept., v. 4, No. 5, 822–32. [18 refs.]

This investigation deals with the growth of *E. histolytica* accompanied by a mixed bacterial flora on a simple medium containing rice products in absence of other nutrients. The strain of amoeba had been maintained for some years previously on the extract medium of the senior author [this *Bulletin*, 1948, v. 45, 179] and was accompanied by a mixed bacterial flora. The rice products used in the test were rice bran, rice polish, polished and unpolished rice flour and pure rice starch. These preparations were added to an agar slant to which 2 per cent. dibasic magnesium phosphate had been added and phosphate buffered saline *p*H 7·4 was layered on top. In another series of tests the agar was omitted and the medium without it was stated to be as efficient as the other in presence of certain rice products in maintaining growth. Later it is stated that results with the medium containing agar were better over a long series of passages, and this was believed to be due to the fact that the bacteria accompanying *E. histolytica* grew better in its presence. Addition of rice bran did not support growth of *E. histolytica*, rice polish and pure rice starch supported only for a short time. On the other hand rice flour from polished or unpolished rice supported growth and multiplication indefinitely. The authors believe that the use of these simple media allows the rôle of added factors, including bacteria in the growth of *E. histolytica*, to be studied.

J. D. Fulton

Nakamura, M. **Growth Factors for** *Endamoeba histolytica*. *Proc. Soc. exper. Biol. & Med.* 1955, Aug.–Sept., v. 89, No. 4, 680–82.

So far *E. histolytica* has not been serially cultured in the absence of living bacteria. Karlsson *et al.* [this *Bulletin*, 1953, v. 50, 707] have

made a study of growth factors for this organism and reported that autoclaved bacterial cells provided something necessary for the survival of *E. histolytica*. In the present studies inocula from cultures of that organism containing a mixed bacterial flora were added to a bi-phasic medium containing 5,000 units of penicillin G per ml. as well as certain potential growth factors. The bacteria present survived only a few hours and after 48 hours at 37°C. counts of amoebae were made. They grew luxuriantly in the presence of added adenosinetriphosphate (ATP) and ribose-5-phosphate with autoclaved bacterial cells. Growth did not occur on subinoculation into a similar medium, but after 9 days on this medium the viability of the amoebae was proved by growth in the stock medium. When, in addition to the above factors, diphosphopyridine nucleotide (DPN) was added to the cultures, it was found possible to subculture 3 times into the bacteria-free medium. Thus DPN, ATP and ribose-5-phosphate appear to have supplied or replaced factors usually supplied by bacteria. *J. D. Fulton*

Alba, M., Artigas, J. & Otto, Irma. Acción de la Puromicina en cultivos de *Entamoeba histolytica*. [**Effect of Puromycin on *Entamoeba histolytica* Cultures**] *Bol. Chileno de Parasit.* 1955, Jan.–Mar., v. 10, No. 1, 9–10. English summary (6 lines).

The effect of Puromycin on *Entamoeba histolytica* was tested *in vitro* on cultures in Balamuth's medium, in which the amoeba was associated with a single species of bacterium, *Escherichia* [*Bact.*] *freundi*. As this antibiotic proved to be bactericidal to the micro-organism in question at a concentration of 200 microgrammes per cc., the tests were carried out at lower concentrations, *viz.* from 4 to 150 μgm./cc. The results were assessed after incubation for 96 hours at 37·5°C. It was found that Puromycin did not inhibit the growth of the amoebae at concentrations of 4–5 μgm./cc. but was amoebicidal at concentrations from 12 μgm./cc. upwards. Since the bacteria were not affected at these concentrations, it is concluded that the antibiotic has a direct action on the trophozoites of *E. histolytica*. *C. A. Hoare*

Buonomini, G. & Ricciardi, M. L. Sulla diagnosi parassitologica di amebiasi. Nota III. L'importanza dell'esame colturale delle feci. [**Parasitological Diagnosis of Amoebiasis. III. Importance of Culture of Faeces**] *Acta Med. Italica.* 1955, July, v. 10, No. 7, 169–71.

The English summary appended to the paper is as follows:—

"The authors call attention on the importance of the culture of feces for a more correct diagnosis of Amoebiasis; the utility of Boeck and Drbolhav's and of Balamuth and Sandza's media is emphasised."

Nelson, T. L., Anderson, H. H. & Thomas, O. **Amebic Hepatitis. Laboratory Findings and Treatment with Erythromycin.** *Amer. J. Trop. Med. & Hyg.* 1955, Sept., v. 4, No. 5, 812–21, 3 figs. on 3 pls. (1 coloured). [15 refs.]

" Amoebic hepatitis " is an indefinite condition which may or may not be associated with an active amoebic infection of the liver. It generally is associated with enlargement of the liver and tenderness in the right upper quadrant and, sometimes, with disturbances in hepatic function as judged by laboratory tests. There is much inconsistency in the reported laboratory findings in this condition, and there is little information on its response to specific drug treatment.

In 1954, 371 cases of intestinal amoebiasis were disclosed in a mental hospital with 2,700 beds in California. Of these 371 patients 29 were particularly examined for liver abnormalities, clinically, by X-rays, by various liver function tests, and by liver biopsy. Not all these examinations were made in every patient; the data collected are set out in a table. In 9 of the 11 patients subjected to actual liver biopsy the consulting pathologist reported a subacute hepatitis, often of focal distribution, in the peri-portal areas and associated with lymphocyte and plasma cell infiltrations; this the authors regard as typical of amoebic hepatitis. On no occasion were amoebae seen in the specimens. After erythromycin treatment this inflammatory reaction diminished. Twenty of these patients treated with erythromycin and one treated with erythromycin and fumagillin showed " a definitely favourable response in clearance of their liver disease ". In 18 of these patients the results of treatment were good, but in 2 only fair. In a further 2 cases the results were equivocal, and in 9 they were bad; subsequent chloroquine treatment of these 9 gave a good result in 6 cases, equivocal in 2, and no response in the last. The results of treatment are displayed in a block graph, which shows the results of the various tests both before and after treatment. The authors are of the opinion that of the 12 tests they employed 6 gave significant information in one-third, or more, of the patients examined for amoebic hepatitis. These were the cephalin flocculation reaction, liver biopsy, the urine urobilinogen content, the corrected erythrocyte sedimentation rate, enlargement or tenderness or both of the liver, and radiological evidence of change in the right lower lung.

A. R. D. Adams

YAWS AND OTHER TREPONEMATOSES

Floch, H. La Réaction Universelle de Kahn dans le pian et la syphilis. [**The Universal Reaction of Kahn in Yaws and Syphilis**] *Arch. Inst. Pasteur de la Guyane Française et de l'Inini. Publication No. 350.* 1955, Jan., 11 pp., 4 figs.

This reaction depends on the degree of precipitation of a serum with lipoidal antigen when 7 dilutions of serum with concentrations of saline varying from 0 (distilled water) to 2·1 per cent. are used. Readings are taken after 3 minutes in the shaker, after 4 hours at +4°C. and again after 24 hours at +4°C. In certain diseases changes, both qualitative and quantitative, occur which are more or less typical of these diseases, *e.g.* syphilis, yaws, leprosy, tuberculosis and malaria; these changes are recorded in diagrams.

Kahn claims to be able to distinguish between yaws and syphilis by means of this reaction. In yaws precipitation is less marked in the weaker concentrations of saline.

The author tried this reaction on 14 yaws sera and 10 syphilis sera. He found an increase of precipitation after 24 hours at 4°C., more intense in the stronger salines in yaws sera while in syphilitic sera the increase was in the strong and also in the moderate salines. He repeated these tests using as antigen Péréthynol A of Vernes but still noted no marked differences between the two types of sera. He used a series of figures, instead of graphs, to record results before incubation, after 4 hours and again after 24 hours; he also tried comparing results at 4°C. and at 26–28°C. (the laboratory temperature in Guiana). Even so he was unable to obtain results which could distinguish between yaws and syphilis.

Results are given in 4 graphs and 2 tables. *T. E. Osmond*

Marquez, F., Rein, C. R. & Arias, O. **Mal del pinto in Mexico.** *Bull. World Health Organization.* Geneva. 1955, v. 13, No. 2, 299–322, 8 figs. [37 refs.]

Pinta is a non-venereal endemic treponematosis; there are said to be more than half a million cases in Mexico; the incidence is 1·61 per cent. for the whole country but in one state, Guerrero, it is said to be 20 per cent.

The disease occurs mostly in the lowlands, is more prevalent in tropical zones and chiefly affects the lower social strata. It is essentially a disease of the young, 90·2 per cent. of cases occurring in persons under 30; it is mainly transmitted by casual contact. The organism, *Treponema carateum*, is indistinguishable from that of syphilis but its cross-immunity with this is doubtful; it does not attack the internal viscera, the central nervous or the cardiovacular system.

The various serum tests for syphilis are usually positive in established

cases; in the early stages they are negative but tend more and more to positivity as the disease progresses till they reach 80–100 per cent. The TPI test does not appear to distinguish the disease from syphilis.

Early pinta shows lesions which are erythematous, circinate or psoriasiform occurring on the lower extremities, face, neck, upper extremities, chest, loins and abdomen, in that order of frequency; the genitalia and scalp are not affected. In the secondary stage lesions become larger, pigmented and later depigmented; recurrences may occur after 1 to 10 years with melanosis due to sensitization. Late pinta is characterized by leucoderma. The various stages tend to merge into one another and are not sharply defined.

As regards histopathology, early lesions show infiltration, around the blood vessels of the dermis, of lymphocytes, histiocytes, plasma cells and neutrophils, followed by mild hyperkeratosis and parakeratosis. In the late stages there is atrophy of the epidermis with thinning of the rete pegs and degeneration of the basal cell layer, collagen and elastic fibres; pigment disappears from the epidermis. Treponemata may be found in the skin in all stages.

Heavy metals have some therapeutic action but Mapharsen far more; best results have been obtained with penicillin; 1·2 mega units of PAM give satisfactory clinical and serological results as do dipenicillin G and Panbiotic. Of 665 cases treated with PAM 16 out of 16 primary, 104 out of 151 secondary and 74 out of 183 late cases were " cured ". Of 92 treated with Panbiotic 3 out of 3 primary, 34 out of 35 secondary and 23 out of 30 late cases were cured. Serological results were not so good; with PAM 65 out of 332 cases were seronegative after 2 years; the corresponding figures for Panbiotic were 10 out of 57.

There are 8 beautifully produced figures showing the various types of pinta lesions. *T. E. Osmond*

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Gomes, J. M. Vigilância sanitária e estrutura social. [**Sanitary Vigilance and the Social Structure**] *Arquivos Facul. de Hig e Saúde Pública Univ. de São Paulo.* 1954, Dec., v. 8, No. 2, 139–66. English summary.

In 1924 a Leprosy Service was created in São Paulo, and handed over to the Public Health Department in 1931. There are records of 171 contacts with infectious cases of leprosy for the years 1924 to 1927. These contacts were examined at that time, but none of them showed

any clinical signs of leprosy. Of the 171 examined 124 showed acid-fast bacilli in the nasal mucosa occasionally but not every time, and were considered suspicious contacts or " latent cases ". [No mention is made as to whether these bacilli were morphologically like lepra bacilli or were like the saprophytic acid-fast organisms very frequently found in the nasal mucosa of healthy persons.] In 28, material obtained by puncture of lymph nodes showed acid-fast bacilli, and many had enlarged nodes.

In 1954, 12 had become leprosy patients, 69 continued as healthy contacts, and 90 had been lost sight of. Surprise is expressed that so few developed active disease in spite of malnutrition, poor sanitation and other adverse circumstances. *Ernest Muir*

Gault, E. W., Jayaraj, A. P. & Gass, H. H. **The Application of Histochemical Methods in the Study of the Skin in Leprosy. Demonstration of Bacillus-Containing Capillaries and Axons by Treatment for Phosphatases.** *Internat. J. Leprosy.* New Orleans. 1955, Apr.–June, v. 23, No. 2, 148–54, 1 text fig. & 10 figs. on 2 pls.

Frozen skin sections of 15 μ thickness were incubated at 37°C. in a substrate containing sodium-B-glycerophosphate and with a *p*H of 9·2–9·3. Phosphate is liberated at the site of phosphatase activity and is fixed there by precipitation by a calcium salt included in the substrate. Treatment with 2 per cent. cobalt nitrate followed by dilute yellow ammonium sulphide produced staining of the phosphate in the capillaries, which stood out as brownish-black, tube-like structures. Also giant cells were shown as containing rounded black deposits. By a similar method, but with a *p*H between 5 and 6 in which acid instead of alkaline phosphatase effects the liberation of phosphate, it is possible to stain the axons and the nuclei of the tissue a black colour. By following this with carbol-fuchsin staining it was possible in skin from a lepromatous case of leprosy to show acid-fast bacilli in swollen parts of axons. " Our findings confirm the presence of bacilli in swollen and apparently degenerated axons, but we are not able from our material to prove that the bacilli had actually travelled along the axon." *Ernest Muir*

Roy, A. N. & Banerjee, G. **Some Preliminary Observations on the Haemagglutination Test for Leprosy.** *Ann. Biochem. & Exper. Med.* Calcutta. 1955, v. 15, No. 1, 55–8.

Using Smith and Scott's modification of the Middlebrook and Dubos technique, the authors tested the sera of 23 patients with lepromatous and 30 with neural leprosy. [No definition is given of the meaning of the word " neural ".] With the lepromatous sera there was definite agglutination in titres from 1 in 2 to 1 in 256; with the " neurals " from negative to 1 in 64. Of 15 healthy contacts with leprosy patients 8 were

negative, 2 reacted at a titre of 1 in 2, 3 at a titre of 1 in 4, 2 at a titre of 1 in 8, and 1 at a titre of 1 in 16. It is concluded that " a follow-up of this procedure for early diagnosis and epidemiological study is indicated ". It is also stated that " antibodies against tuberculosis and leprosy appear to have something in common so far as *in vitro* antigen-antibody reaction is concerned " [but no mention is made of the relationship with tuberculosis which the subjects used in the test may have had]. *Ernest Muir*

Rabson, A. S. **C-Reactive Protein in Serum of Patients with Leprosy.** *Internat. J. Leprosy.* New Orleans. 1955, Apr.–June, v. 23, No. 2, 155–61, 1 fig. [15 refs.]

An abnormal serum protein called C-reactive protein (CRP), which reacts with the C polysaccharide of the pneumococcus, has been found in a wide variety of inflammatory processes [*Bull. Hyg.*, 1931, v. 6, 212]. Because of " the frequent difficulty encountered in evaluation of the degree of inflammatory response to the organism by clinical or available laboratory methods, a study of levels of CRP in 100 patients with various types of leprosy in both active and arrested states was undertaken ". Of 47 patients with active lepromatous leprosy 37 had CRP in the sera. That was not so much to be wondered at, but of 41 with arrested leprosy 16 showed CRP, and of 12 tuberculoid type 7 with clinically arrested lesions showed CRP. In some but not in all of the patients in the 2 latter categories there was an inflammatory condition apart from leprosy to account for this phenomenon. There was also absence of CRP in some active lepromatous cases to be explained. In 19 out of 24 cases of leprosy with secondary amyloidosis the presence of CRP was described. The relationship of amyloidosis to CRP requires further study.

Ernest Muir

Guinto, R. S., Doull, J. A. & Mabalay, E. B. **A Note on the Lepromin Reaction in Males and Females of the General Population of Cordova, Mactan Island, Cebu, Philippines.** *Internat. J. Leprosy.* New Orleans. 1955, Apr.–June, v. 23, No. 2, 131–4.

As lepromatous leprosy is generally found to be more frequent in males than in females, and the positive lepromin reaction is considered a sign of higher resistance to leprosy, an investigation was made to find whether a positive lepromin reaction was more common in men than in women. Three surveys made in Cordova in 1933, 1941, and 1948 [this *Bulletin*, 1955, v. 52, 1094] showed the proportion per thousand of males to females with lepromatous leprosy respectively: 17·1 to 4·2, 12·9 to 3·3, and 10·6 to 2·4.

The lepromin test performed on 776 males and 1,075 females of the general population gave only 3·9 per cent. males and 6·1 per cent.

females with an early positive reaction. The average late positive reading for all ages was 66·5 per cent. for males and 69·9 for females. "As far as reactivity of apparently healthy persons to lepromin may be accepted as an indication of their resistance to leprosy, there is no evidence in these results that males are less resistant than females." *Ernest Muir*

Guinto, R. S., Doull, J. A. & Mabalay, E. B. **The Mitsuda Reaction in Persons with and without Household Exposure to Leprosy.** *Internat. J. Leprosy.* New Orleans. 1955, Apr.–June, v. 23, No. 2, 135–8.

Former workers [this *Bulletin*, 1942, v. 39, 226; 1944, v. 41, 48; 1951, v. 48, 372] are quoted who showed that, in those exposed to possible infection with leprosy, reactors to the Mitsuda test were more numerous than among those less likely to have been so exposed.

To test this, the Mitsuda reaction was examined in 3 groups: those with no household exposure to leprosy, those with household exposure to lepromatous leprosy, and those with household exposure to non-lepromatous leprosy. The only significant difference was in the 10–14 age-group, where those exposed to lepromatous infection showed 81·1 per cent. positives, compared with 60·3 and 53·7 per cent. respectively in the other two groups, and this requires further investigation. Otherwise, household exposure to lepromatous leprosy does not appear to lower resistance to leprosy or increase the chance of acquiring reactivity to the lepromin test. Household exposure to non-lepromatous leprosy appears to have no influence on reactivity of contacts to lepromin.

Ernest Muir

Hale, J. H., Molesworth, B. D., Grove-White, R. J., Sambamurthi, C. M. & Russell, D. A. **The Relationship and Significance of the Mantoux and Lepromin Reactions in Leprosy.** *Internat. J. Leprosy.* New Orleans. 1955, Apr.–June, v. 23, No. 2, 139–47.

Descriptions are given of 6 experiments in Singapore and Selangor. (1) It was found that in 785 patients with leprosy the number of positive Mantoux reactions was smaller than in the general population. This was particularly so among the young children, and was less marked among adults. (2) Of 51 healthy schoolchildren 74·5 per cent. [38] were Mantoux positive and 29·4 per cent. [15] lepromin positive. (3) Of 50 tuberculous patients 88 per cent. [44] were Mantoux positive and 54 [27] lepromin positive. The object of these last two experiments was to determine whether the positive lepromin reactions found in children was due to allergy to some group-specific antigen of the mycobacteria resulting from exposure to the tubercle bacillus. (4) Out of 177 lepromin and Mantoux negative children vaccinated with BCG 143 became Mantoux positive, and of the latter, 66 per cent. also became positive to lepromin. Of the other

34 who remained Mantoux negative, 29 per cent. reacted to lepromin. (5) Of 137 negatively-reacting children with leprosy who were vaccinated with BCG, 58 per cent. showed Mantoux conversion. (6) Sixty-nine newly admitted leprosy patients were given lepromin and tuberculin tests at frequent intervals. Among the lepromatous cases the Mantoux rate increased from 10 to 37 per cent. It is suggested that this may have been because these patients were sheltered from contact with tuberculosis outside because of their isolation for leprosy, and that they only came in contact with tuberculosis after admission to the leprosarium.

The conclusion drawn from these experiments is that leprosy may infect a selected population consisting of people who are Mantoux negative, tuberculosis infection giving some protection against leprosy. "The conversion to a Mantoux positive state appears to be the essential feature, not the positive lepromin response, that may result from such vaccination. The latter response, it is suggested, is nonspecific." [This paper is one of much interest, but because it is so full of practical details it is difficult to abstract, and should be read in the original.]

Ernest Muir

Destombes, P. & Chambon, L. Traitement des réactions lépreuses par la phénylbutazone. [**Treatment of Lepra Reaction with Phenylbutazone**] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 4, 454–8.

Following the work of Ravina and Pastel in acute inflammatory conditions in tuberculosis, the authors tried derivatives of pyrazolidine. Five patients suffering from lepra reaction were given 6 intramuscular injections of 5 cc. of 20 per cent. solution of phenylbutazone, 1 every 3 days for 3 patients and 2 courses of 1 injection daily for 3 days with an interval of 2 days between the 2 courses for the other 2. Five other patients were given orally in tablet form 300 to 400 mgm. daily for 7 to 9 days.

The results were found to be at least as good as those obtained with corticotrophin and more lasting. First of all pain disappeared generally within 24 hours, and this was followed by a fall of temperature and the reduction of inflammation of skin and nerve lesions. One of the patients was of the tuberculoid type, though the histological picture was at first obscured by the reaction, and appeared to be lepromatous. However, 12 days after the 4th injection the histological picture had changed to be typically tuberculoid. Swelling of the prominent swollen nerves was quickly reduced. Slight traces of albumin were found in the urine, but these were transient and not considered as contra-indications. There was also aqueous retention and oedema occasionally, but this quickly passed off. In only one case was there a return of reaction after treatment was finished, and this quickly subsided when the treatment was renewed. Phenylbutazone has another advantage over corticotrophin in that it is much less expensive.

Ernest Muir

Dharmendra, Chatterji, S. N. & Sen, N. R. **A By-Product of D.D.S. for Treatment of Trophic Ulcers in Leprosy.** *Leprosy in India.* 1955, July, v. 27, No. 3, 180–85, 16 figs. on 6 pls.

The product used is obtained in the manufacture of DDS, and is the substance from which DDS has been extracted by alcohol. It is a dark-coloured sticky substance, containing a quantity of 2:4′-diaminodiphenyl sulphone, in contrast to DDS which is 4:4′-diaminodiphenyl sulphone. The former is much more soluble in alcohol than the latter. The sticky substance also contains a certain amount of DDS. It is applied to trophic ulcers of the soles of the feet as a dressing and the patients are allowed to walk about. The treatment was used in 22 patients chiefly of the tuberculoid type, 18 of whom had had previous treatment without results. In 15 the ulcers healed completely and the patients had no relapse for a period of a year. In the others, though the ulcers became cleaner and smaller, there was not complete healing. X-ray examination showed that when the ulcers did not heal there was diseased or dead bone. Trials with DDS dissolved in alcohol showed that the healing effects could not be due entirely to the DDS present in the by-product. *Ernest Muir*

Roy, A. T. **Thiosemicarbazone. (In the Treatment of Leprosy, in DDS Intolerant Cases and in combination with DDS.)** *Leprosy in India.* 1955, July, v. 27, No. 3, 187–93. [14 refs.]

Eight patients intolerant of DDS because of lepra reaction were treated with thiosemicarbazone with a daily dosage of 25 rising to 150 mgm. The reactions were less severe and frequent than they had been with DDS and there was clinical and bacteriological improvement. A combination of DDS and thiosemicarbazone did not give better results than with either drug separately. Satisfactory results were also obtained in 8 other patients who had not been treated previously. *Ernest Muir*

Scragg, R. F. R. **Isoniazid in Leprosy.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, Nov., v. 49, No. 6, 548–54. [11 refs.]

Five lepromatous-type patients and 1 tuberculoid, who had responded poorly to sulphones or had suffered from repeated reactions under sulphone treatment, were placed on isoniazid treatment alone for 17 to 26 months. The daily dosage ranged from 3.9 mgm./kgm. to 9 mgm./kgm. of body weight. In 4 of the 5 lepromatous patients there was clinical improvement, but none in the tuberculoid. There was an improvement in the bacteriological findings in the 5 lepromatous patients, the mean index diminishing from 6·4 to 0·5. Two of the patients developed lepra reactions during treatment, and 2 of them had severe neuritis.

The results obtained differ from those of other workers who have noted

no improvement [this *Bulletin*, 1953, v. 50, 127; 1954, v. 51, 699]. The author attributes this to the larger doses used. [As there were no controls there is nothing to indicate to what extent the good results were attributable to delayed action of the sulphones given previously.]

Ernest Muir

Satani, Y., Nishimura, S., Kono, M., Nojima, T. & Takahashi, T. **Intracutaneous Injection of Acidomycin (Satani's Method) in the Treatment of Leprosy. Preliminary Report.** *Internat. J. Leprosy.* New Orleans. 1955, Apr.–June, v. 23, No. 2, 124–30. [15 refs.]

Acidomycin is an antibiotic obtained from *Streptomyces acidomyceticus*. It is strongly active against streptomycin-resistant strains of the human tubercle bacillus *in vitro*, but has no antituberculosis effect in animal and human experiments. Intradermal injections were given in lesions of 15 leprosy patients (6 tuberculoid, 6 lepromatous and 3 neural) in a dosage of 0·2 to 0·3 cc. of solutions containing 10 to 40 mgm. per cc 2 or 3 times weekly for several months. "After a few injections the area surrounding the injected sites gradually became pale in color. The elevation due to the leprous infiltration also flattened down to the level of the healthy skin, and finally the lesion disappeared entirely after 2 to 6 months of injections." In several cases lesions at a distance from those injected showed improvement. Further tests are to be made to see whether, when injections are made into healthy skin, lesions at a distance will improve. Short notes are given of each of the 15 patients. Many of them had had previous treatment with Promin or with streptomycin.

Ernest Muir

Laviron, P. & Kerbastard, P. A. Note préliminaire sur le traitement des maux perforants et ulcères lépreux par le déhydrocholate de sodium. [**Preliminary Note on the Treatment of Perforating and Other Ulcers in Leprosy with Sodium Dehydrocholate**] *Méd. Trop.* Marseilles. 1955, Mar.–Apr., v. 15, No. 2, 217–21.

This is the same as the paper abstracted in this *Bulletin*, 1955, v. 52, 1099.

Gramberg, K. P. C. A. **Nerve Decapsulation in Leprosy Patients.** *Internat. J. Leprosy.* New Orleans. 1955, Apr.–June, v. 23, No. 2, 115–23.

"An operative treatment is described for the thickened painful nerves of leprosy patients, which consists of the removal *in toto* of the fibrotic epineural sheath of these nerves, i.e., decapsulation. The operation, which can be done under local anesthesia, should be performed in as

many cases as can possibly benefit from it. There is practically no danger of complications.

"The technique of the operation is described in detail so that it may be performed by doctors working in remote leprosy hospitals who have had little surgical training, because in practice the beneficial effects on the patients are so great. Pain and paresthesias disappear in nearly all cases. In the presence of threatening paralysis and slight atrophies, a prolonged if temporary halt may be expected. The psychological effect is profound."

CONVIT, J., LAPENTA, P. & JÓRGENSEN, J. **The Mantoux and Mitsuda Reactions in Hamsters and Guinea-Pigs before and after Vaccination with BCG.** *Internat. J. Leprosy.* New Orleans. 1955, Apr.–June, v. 23, No. 2, 162–6.

A study was made in 120 hamsters which were tuberculin and lepromin negative. They were divided into groups and vaccinated orally, intradermally and intracardially with BCG. Tests made from the 4th to the 16th day showed that the tuberculin and lepromin reactions remained negative.

Forty-five guineapigs, all tuberculin and lepromin negative, were divided into 5 groups; 4 groups were vaccinated with BCG orally, intradermally, intracardially, or by all 3 methods combined, the 5th group being left as an unvaccinated control. The first 4 groups all became Fernandez and Mitsuda positive; the first group (oral) and the third (intracardial) remained tuberculin negative, but the 2nd and 4th became positive. Of the 9 control guineapigs 7 became Mitsuda positive and weakly Fernandez positive.

It is concluded that hamsters are not immuno-allergically responsive to lepromin or tuberculin. The fact that the unvaccinated control guineapigs became positive to lepromin is explained by their being more mature. [Another explanation, as suggested by WADE, is that the original lepromin test antigen acted as a microvaccination sufficient to convert the lepromin reaction.] *Ernest Muir*

CHANG, Y. T. **Chemotherapy of Murine Leprosy. IV. The Effects of Amithiozone (TB1/698), *p*-Aminosalicylic Acid (PAS), B283 (a Phenazine Pigment), Five Antibiotics and Three Diphenylthiourea Compounds on Mouse Leprosy.** *Internat. J. Leprosy.* New Orleans. 1955, Apr.–June, v. 23, No. 2, 167–80, 1 text fig. & 8 figs. on 2 pls. [22 refs.]

"Studies have been made of the therapeutic effects on murine leprosy of several drugs and antibiotics, employing the intraperitoneally-infected mouse. The following results were obtained:

"Amithiozone (TB1/698) seemed to cause some stimulation of the infection.

"PAS (*p*-aminosalicylic acid), B283 (a phenazine pigment), chlortetracycline (Aureomycin), oxytetracycline (Terramycin), chloramphenicol (Chloromycetin), penicillin, erythromycin (Ilotycin), and three derivatives of diphenylthiourea, i.e., SU-1795, SU-1906 and SU-2358, revealed no significant activity."

HELMINTHIASIS

In this section abstracts are arranged as far as possible in the following order:—Trematodes (*schistosomes, other flukes*); Cestodes (*Diphyllobothrium, Taenia, Echinococcus, other cestodes*); Nematodes (*Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.*).

Gaud, J. Les bilharzioses en Afrique occidentale et en Afrique centrale. [**Schistosomiasis in West and Central Africa**] *Bull. World Health Organization.* Geneva. 1955, v. 13, No. 2, 209–58, 11 figs. [16 refs.]

This paper combines a review of the literature concerning human schistosomiasis in French West and Central Africa, together with the results of a field study in 1950. The geographical distribution of *Schistosoma haematobium*, *S. mansoni* and *S. intercalatum* is mapped tentatively, but it is noted that the basic information is imperfect, being dependent on factors which vary from place to place. Infection is distributed widely in a variety of physical and geographical environments. It cannot be correlated with winter or summer isotherms or with isohyets, but it occurs in savannah country rather than forest and tends to be more prevalent along large rivers than along smaller ones. *S. haematobium* is associated with the plains while intestinal schistosomiasis shows a higher prevalence in mountainous areas and is more common close to the equator than *S. haematobium*. The presence of snail hosts does not alone determine distribution for they are found where the disease is rare or absent.

Human factors are very important in determining distribution. In some places the disease was confined to a particular tribal area. It is suggested that *S. haematobium* was imported by migrating Sudanese tribes from the north and *S. mansoni* by Bantu tribes from the east. The separation or co-existence of the two infections depends on the amount of mixing of the tribes from the two civilizations. The degree of population concentration around water supplies affects density of infection; the low incidence of *S. mansoni* in forest areas, in spite of the

presence of vectors and of contamination of water, is attributed to the sparsity of population. There seems to be a threshold below which the parasite maintains itself with difficulty, and this should be remembered by administrators who like to concentrate the people and thus create foci of infection.

Although estimates give between 5 and 6 millions infected with *S. haematobium* and between 1 and 1½ millions with *S. mansoni* in the area under discussion, schistosomiasis is ranked eleventh in the list of reported diseases. Morbidity reported as a result of infection is below 1 in 400 though *S. mansoni* causes a definite mortality. It is thought that the importance of schistosomiasis as a causative factor in other and serious conditions has been overestimated. No association could be traced between this infection and primary liver carcinoma, schistosomal appendicitis or rectal stenosis, but spleno-hepatitis with ascites is always related to endemic *S. mansoni* infection. *S. haematobium* appears to be associated with urinary lithiasis and certain other genito-urinary lesions. Breaches of the intestinal mucosa due to the passage of *S. mansoni* eggs may facilitate secondary bacterial infection but no association was noted with amoebic dysentery or the intestinal flagellates.

With regard to control, no general policy has been adopted in French West and Central Africa. Though mass treatment gives good results, eradication cannot be expected without, in addition, provision of latrines and protection of water supplies. A major difficulty in mass treatment is that individuals not suffering obvious disability will not submit to an unpleasant treatment régime. At present treatment is used as a palliative in severe cases rather than to control the reservoir of infection. In rural areas it would be valuable to impound springs and provide protected bathing and washing facilities. Molluscicides should be used, especially in stagnant water, and vegetation control might be of value. The author discusses health education and its difficulties in Africa. While films are of some value and the African is interested in them, he learns no lesson from them. To be successful the film should be simple, the action slow and the commentary should be spoken in the local language.

The factors tending to spread schistosomiasis are population movement, concentration around water supplies and the development of new industries or agricultural methods. The importation of labour from an infected locality should be avoided or the infected persons, together with their families, should be treated. Population concentrations demand protected water supplies and sanitary services, and snail control should be carried on. The introduction of fish culture and irrigated crops may lead to increased schistosomiasis but this is preferable to nutritional disease. Special care should be taken to reduce the risk of spread of the disease, for example, by mechanization of farming.

[This long paper cannot be summarized adequately and will repay reading. Particularly valuable sections are those dealing with racial factors in the distribution of schistosomiasis, the pathogenicity of the

infection, and control measures, especially the discussion on health education.] *T. H. Davey*

Gaud, J. Les bilharzioses à Madagascar et aux îles Mascareignes. [**Schistosomiasis in Madagascar, Réunion and Mauritius**] *Bull. World Health Organization.* Geneva. 1955, v. 13, No. 2, 259–88, 9 figs. [19 refs.]

This paper reports the results of an investigation carried out in 1950–51. The general incidence of schistosomiasis is low, averaging 0·3 per 1,000 inhabitants in the case of *Schistosoma haematobium* and 0·1 per 1,000 for *S. mansoni*. The infection ranks sixteenth among the diseases of public health importance in Madagascar and twelfth among those causing death. Most of the cases are sub-clinical. The distribution is uneven and only some three-fifths of the island is affected, *S. haematobium* being endemic all along the west coast and *S. mansoni* in the southern half and on the southern part of the central plateau. Apart from clinical conditions directly attributable to infection the only others which could be correlated with schistosomiasis were splenomegaly, which was epidemiologically associated with intestinal schistosomiasis rather than malaria, urinary lithiasis with *S. haematobium* and probably bacterial intestinal infections, particularly *Shigella*, with *S. mansoni*.

Though the disease does not constitute a grave problem, there exist the risks of local aggravation and of extension to uninfected areas. *Bulinus* and *Biomphalaria* snails have been reported from areas outside the endemic zone. Altitude and climate fail to explain the distribution of the disease, but the two parasites appear to be restricted to certain tribes. It is concluded that there is little risk of actual spread to uninfected areas but, although the incidence appears to be declining, a change in the method of growing rice—at present flooded for only a short period—might increase local infection. Commenting on possible control measures the author states that mass treatment is unlikely to be valuable in Madagascar because the inhabitants object to parenteral treatment. Owing to the extreme modesty of the women the provision of latrines would help little, since they would be used only by the men, and the provision of safe facilities for bathing and washing would not solve the problem. The use of molluscicides in suitable habitats is recommended, and it is believed that health education would be more effective on the island than in Central Africa.

The island of Réunion is free of both forms of schistosomiasis and no specimens of *Bulinus* or *Biomphalaria* were found on careful survey. In Mauritius only *S. haematobium* was found. It is not a public health problem but its transmission is a puzzle. *B.* (*Pyrgophysa*) *forskali* has been regarded as the vector but the shells examined by the author appeared to differ from typical examples of that species. *T. H. Davey*

Bennie, Iris & Blair, D. M. **Urinary Bilharziasis in European School Children in Southern Rhodesia.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, Sept., v. 49, No. 5, 424–34.

At intervals since 1921 the incidence of schistosomiasis has been studied in European children at Government schools in Southern Rhodesia and a substantial infection rate was noted, especially among boys, though it was considerably lower than in African children. In 1954 the European children in Government schools in Salisbury and for 50 miles around were examined for urinary schistosomiasis. One specimen of urine was obtained from each child after 5 minutes of mild exercise and the last few ounces were collected and examined microscopically after centrifuging, and by hatching in cases where red blood cells without ova were seen in the centrifuged deposit.

Specimens were obtained from 10,019 children and 4·2 per cent. were found infected. In 5 instances *Schistosoma mansoni* as well as *S. haematobium* ova were present in the urine. The infection rate of the individual schools varied from nil to 23·2 per cent. The highest incidence was found in schools on the banks of rivers which drew their pupils from the immediate vicinity. Boys showed a higher infection rate (4·84 per cent. in 5,327) than girls (3·55 per cent. in 4,692). Among boys the age distribution of infection reached a peak at 11 years (7·9 per cent.) and then declined to 4·2 per cent. at 15 years and over, while in girls the incidence continued to rise. The incidence was highest in children born in Southern Rhodesia, but infection rates approaching the average were found in children who had as little as 2 years' residence there. Schools showing higher infection rates (between 8 and 23 per cent.) either contained a high proportion of children born in Southern Rhodesia or were close to sources of infection. In 2 schools for senior boys where infection rates were fairly high, the pupils were re-examined more than 6 months later and after treatment of those diagnosed, and a large number of apparently new cases were discovered. This suggested either that the boys were being continuously exposed to infection or that, excretion of eggs being intermittent, they had been missed at the first examination. This second alternative received some corroboration from the fact that a number of boys with red cells in their urine but without schistosome ova had been noted during the first investigation.

The results of this survey indicate that little change has taken place as compared with previous surveys. By the time children first come to school 2 per cent. are already infected. Examination based on a single specimen of urine is not good enough to diagnose even the majority of the cases; antigen tests should be used to identify negative reactors so that a more intensive examination of potentially infected persons may be made. The provision of swimming baths on the most generous scale possible is recommended, together with a programme of health education among children and parents. *T. H. Davey*

Schwetz, J. **On African Schistosomiasis.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, Sept., v. 49, No. 5, 435–6.

This paper is a criticism of an article by Amberson and Schwarz [this *Bulletin*, 1954, v. 51, 394] in which they proposed to simplify the classification of Planorbidae by regarding all vectors of *Schistosoma mansoni* as synonyms of *Biomphalaria alexandrina* with two subspecies, *B. a. alexandrina* and *B. a. pfeifferi*, and by classifying the vectors of *S. haematobium* in one genus, *Bulinus*, within which they placed the 3 species acting as vectors, *viz.*—*B. africanus*, *B. truncatus* and *B. forskali*. The author contends that this classification is just as artificial as the numerous others, and much too simple. He maintains that *Planorbis pfeifferi* is a river species and that there is a number of lake *Planorbis* which are vectors and which can be differentiated readily from *P. pfeifferi* by shell characters, but which in this classification are regarded as synonyms. With regard to the Bulininae, while there is no marked zoological difference between *Bulinus*, *Physopsis* and *Pyrgophysa*, there are ecological and conchological differences justifying special names. Though some of them do not transmit *S. haematobium* in nature, laboratory investigations have shown them to be potential vectors. The author agrees that the existing confusion in the classification of the Planorbidae requires clarification but he contends that any new classification should be based on ecological and malacological evidence.

He further disagrees with the grouping by Amberson and Schwarz of helminths resembling *S. haematobium*, many of which are regarded as subspecies of it. He criticizes the omission of *S. rodhaini* which is biologically and morphologically distinct from *S. haematobium* and he corrects the statement that *S. intercalatum* is present throughout a great part of Belgian Congo, pointing out that it is limited to a single focus.

T. H. Davey

Gismann, Anne. **Notes on various Molluscan Genera of the Family Planorbidae involved in the Transmission of Bilharziasis in Africa and the Near East.** *J. Egyptian Med. Ass.* 1954, v. 37, No. 10, 1163–84, 7 figs. [Numerous refs.]

The author sets out to review for Egyptian parasitologists the systematic position with regard to the snails transmitting schistosomiasis in the area. [Since the publication of the paper in *J. Egyptian Med. Ass.*, a reprinted version with minor amendments has been issued, and later a list of major corrigenda and addenda circulated. It is intended to publish this list in a later issue of the same journal.] Some account of difficulties in the systematics of these snails is given, and the impossibility of using only shell characters for speciation is emphasized. Throughout the paper some account is given of the history of the nomenclature in the forms discussed. The author points out that, although the

terrestrial fauna of Egypt is largely Palaearctic in character, the molluscs of fresh waters in the area belong distinctly to the Ethiopian zoogeographical region. The author gives definitions of the family Planorbidae and of the subfamilies Planorbinae and Bulininae, and then surveys certain of the genera within them. [The definitions given are over-generalized and include several inaccuracies.] In the Planorbinae, *Gyraulus mareoticus* and *Planorbis planorbis* var. *philippii* are mentioned as examples of Egyptian planorbids which are not vectors. It is noted that modern malacological opinion restricts the genus *Planorbis* to such medium-sized, flat-whorled, and keeled species as *P. planorbis*, while the relatively large planorbids with whorls circular in cross-section, are assigned to the genus *Planorbarius*, with *P. corneus* as type species. A *Planorbarius* sp. may carry vesical schistosomiasis in Portugal. The large Ethiopian planorbids, all susceptible to infection by *Schistosoma mansoni*, should all be referred to the genus *Biomphalaria*, including those placed in *Afroplanorbis* by Thiele, *e.g. A. sudanicus*, and also *A. boissyi*, the latter being the most important vector of *S. mansoni* in Egypt. The author points out that a large number of specific names (approximately 40) have been applied to planorbids from Ethiopian regions, capable of transmitting *S. mansoni* and now all placed in the genus *Biomphalaria*, and that the number of recognized species has already been substantially reduced, and that there will undoubtedly be further consolidation. Of particular importance in this respect is that the earliest description of this kind of planorbid from Egypt was of *Planorbis alexandrinus* Ehrenberg, 1831, and it is probable that the important vector species *boissyi* (dating from 1838) is conspecific. As a result the familiar Egyptian "*Planorbis boissyi*" may have to be known as *Biomphalaria alexandrina*. Similarly, many vector "species" in other parts of Africa may be placed in synonomy with *Biomphalaria pfeifferi*. The author next considers the subfamily Bulininae, but has unfortunately not had access to the detailed anatomical work of Hubendick on this group [this leads to an unnecessary discussion of the generic, or subgeneric, term *Pyrgophysa*, now considered merely a synonym of *Bulinus*, see this *Bulletin*, 1955, v. 52, 656]. As regards the important vectors of *Schistosoma haematobium* in Egypt, the author believes that consolidation of "specific" names is also needed here, and suggests that the "northern forms"—*contortus*, *brocchii*, *dybowskii*, *innesi*, *hemprichii*, and others—all belong to a single species which should bear the earliest name, *i.e. Bulinus truncatus*. Useful outline drawings are given of:—*Biomphalaria boissyi*, *Planorbis planorbis* var. *philippii*, *Gyraulus mareoticus*, *Bulinus forskali* and other *Bulinus* spp. from Egypt, and a *Physopsis* sp. from Natal.

The author then passes to a consideration of host-parasite relationships [but her consideration of the position with regard to *S. haematobium* is unnecessarily complex as a result of confusion of species falling into the two subgenera, *Physopsis* and *Bulinus* s.s.]. The author quotes

"*Pyrgophysa*" *forskali* as a vector of secondary importance in several countries including Egypt, and as the principal vector in Mauritius. The author correctly considers that laboratory experiments on the susceptibility of various snail species to infection by schistosomes is inconclusive in assessing the epidemiological significance of snail populations. However the presence within certain species of physiological variants of differing susceptibility can no longer be doubted. The author ends with a few references to peculiar intermediate hosts of schistosomes, mentioning reports on a *Melania* and a *Lymnaea* transmitting *S. haematobium* and on *Bulinus* transmitting *S. mansoni*. All these reports are, in varying degrees, doubtful, and some of the author's corrigenda deal with them.

[The author claims this as only an "informal outline of the subject", but it is to be hoped that, with her detailed knowledge of the specific position in Egypt, she will produce a revised survey bringing her nomenclature into line with the recommendations of the *WHO Technical Report, Series No. 90* (this *Bulletin*, 1955, v. 52, 656), and with the detailed work on the phylogeny of the Planorbidae recently produced by Hubendick (*Trans. Zool. Soc. Lond.*, 1955, v. 28, 453).]

W. Russell Hunter

Deschiens, R. & Lamy, L. Préhension et ingestion des mollusques vecteurs des bilharzioses par les écrevisses du genre *Cambarus*. [**Capture and Ingestion of Snail Vectors of Schistosomiasis by Crayfish of the Genus** *Cambarus*] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 2, 201–3, 4 figs. on 2 pls.

The authors have already shown that certain crayfish of the genera *Astacus* and *Cambarus* are predatory on planorbid vectors of schistosomes [this *Bulletin*, 1955, v. 52, 909]. However, these crayfish also attack various small molluscs, so that their value in the control of schistosomiasis is relative. *Cambarus affinis* is a tropical American species, which can live in fresh water at temperatures between 4° and 28°C. In the laboratory, the molluscs exposed to these crayfish are rapidly caught and crushed by *Cambarus*, especially if these are starved for 24 to 48 hours. The same phenomenon may be observed in nature over a period of days. The action of the crayfish in attacking and destroying their prey is described and illustrated in 4 photographs.

The *Cambarus* can fast for 4 to 5 days and its subsequent need for food may be utilized in employing it as a molluscicide. It is calculated that a *Cambarus* of 20 to 30 gm. weight can consume daily 1 to 2 gm. of molluscs, corresponding to about 2 average specimens of *Planorbis* [*Australorbis*] *glabratus*.

It would seem that these crayfish need a certain adaptation to an exclusive diet of planorbids.

The authors advocate the employment of *Cambarus* in limited collections of water containing molluscs. *H. J. O'D. Burke-Gaffney*

Deschiens, R., Dechancé, Michèle & Vermeil, C. Action prédatrice des crabes d'eau douce du genre *Potamon* sur les mollusques vecteurs des bilharzioses. [**Predatory Action of Freshwater Crabs of the Genus *Potamon* on Snail Vectors of Schistosomiasis**] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 2, 203–7, 4 figs. on 2 pls.

Arising out of the observations on crayfish of the genus *Cambarus* discussed above, the authors point out that these crayfish, as far as they are aware, are not among the fauna of North Africa and attempts are being made to acclimatize them there. On the other hand, freshwater crabs of the genus *Potamon* are common in North Africa, from Egypt to Morocco and the authors now discuss their possible value as predators of molluscan vectors of schistosomiasis. The common forms are *Potamon edule* in Morocco, Algeria and Tunis and *P. potamios*, *P. berardi* and *P. nilotica* in Egypt. The biology of the crabs is briefly described.

Twenty *Potamon edule* sent to Paris from Tunis by air in a box containing damp vegetation, arrived in excellent condition and most of them also survived a subsequent journey to the Antilles. They were placed in groups of 4 or 5 in an aquarium with fresh water, sand and pebbles, with fish and planorbids to feed upon.

It was difficult to estimate their predatory activities, as they were very fierce and more active at night, but nevertheless it was found that they destroyed the molluscs overnight. The average crab, weighing 25 gm. was able to ingest 5 to 6 molluscs (1 to 2 gm. weight) in 24 hours. Experiments showed that *Potamon* and *Cambarus* would not live in the aquarium in peaceful co-existence, as the crabs tended to attack the crayfish.

However, it was clear that under experimental conditions these crabs did attack and ingest planorbids, though they did not seem to be as efficient as the crayfish in this respect. It may well be that under natural conditions the more powerful and resistant crabs might prove to be suitable as predators of planorbids; only field experiments in natural waters will prove this.

The paper is illustrated with 4 photographs of *P. edule* in action.

H. J. O'D. Burke-Gaffney

Shamma, A. H. **Schistosomiasis and Cancer in Iraq.** *Amer. J. Clin. Path.* 1955, Nov., v. 25, No. 11, 1283–4.

The author reports a study of autopsy material collected at the Central Pathology Institute, Baghdad between 1939–1952. In 2,276 autopsies, 174 (7 per cent.) cases of carcinoma were found and in 113 instances (5 per cent.) involvement of the urinary bladder by *Schistosoma haematobium* was found.

The results, for different sites, are tabulated. Of the 174 persons with cancer, 17 also had schistosomiasis. The commonest cancer associated with schistosomiasis was in the bladder (7 cases), followed by the

prostate and genitalia (3), liver (3) and the intestine and rectum (2). Two other sites were also involved.

Thus in those with proved schistosomiasis of the bladder, cancer of this organ was present in 7 (6 per cent.).

The author stresses the view already held that *S. haematobium* ova in these sites should be regarded as of carcinogenic importance, even though cancer develops in only a minority of infected persons. Apart from non-specific chronic irritation, it is not known how the ova exert their carcinogenic action. *H. J. O'D. Burke-Gaffney*

Dimmette, R. M., Sproat, H. F. & Klimt, C. R. **Examination of Smears of Urinary Sediment for Detection of Neoplasms of Bladder. Survey of an Egyptian Village infested with** *Schistosoma haematobium*. *Amer. J. Clin. Path.* 1955, Sept., v. 25, No. 9, 1032–42. [20 refs.]

Examinations for malignant growths have for some time past been made by study of the exfoliated cells present in various secretions. The technique has been used in the diagnosis of malignant disease of the bladder, as cancer cells are claimed to be recognizable in the urines of a high proportion of cases of vesical carcinoma.

As carcinoma and papilloma of the bladder are said to be common complications of schistosomiasis in Egypt, the authors took the opportunity of doing cytological studies of 1,664 urine specimens from 1,556 persons living in a village near Cairo, where schistosomiasis is endemic. Patients from whom cells suggestive of malignancy were recovered in the urine were subjected to cystoscopic examination and, where possible, cystoscopic biopsy. Details of the methods of collection of the urines and of the technique of cytological examinations are set out in the text. Information on the numbers, and the age incidence and sex of those examined and found to be passing *Schistosoma haematobium* eggs in the urine, and the findings in those in whom suggestive cell changes were suspected, are clearly set out in several tables.

Males were found to be more commonly infected with *S. haematobium* than females. The sex incidence in the 0–5 age-group was equal; but thereafter the incidence in males markedly increased, reaching a peak between 11 and 20 years. The incidence of egg-recovery in the urines of males between 11 and 25 years exceeded 50 per cent., while only about one-third of females of this age-group were passing eggs. One-third of the males between 25 to 55 were passing eggs, compared with one-fifth of the females in this same age-group. In the urines of males the association of cellular change and the presence of schistosome ova was 75·6 per cent.; in those of females it was less than 50 per cent.; only 28·7 per cent. of urines with a normal cellular content contained ova. Examination of 24-hour specimens of urine on 3 successive days is

necessary before excluding active vesical schistosomiasis with the passage of ova.

Cystoscopic examination of 19 persons, suspected on the urine cytology of having malignant bladder changes, showed a fairly high correlation in the findings, but confirmatory biopsy was not possible in all cases. Every case with an altered exfoliative cytology should therefore be systematically examined for neoplastic changes in the genito-urinary tract. Nevertheless, in practice the interpretation of the cytological changes was complicated by many difficulties, such as obtaining urine uncontaminated by faeces or vaginal discharges, and the presence of the secondary pyuria. Other factors, such as the high cost of the work, and the labour and time involved, render this procedure of little value in a mass survey for the detection of malignant tumours of the bladder. *A. R. D. Adams*

Lichtenberg, F. & Valladares, C. do P. **Compression Examination of Fresh Tissue for Ova of** *Schistosoma mansoni*. *Amer. J. Clin. Path.* 1955, Sept., v. 25, No. 9, 1099–102, 3 figs.

Maceration, and fixation and section, of tissues are inconvenient and time-consuming methods of search of tissue for schistosome eggs. The direct microscopical examination of a fragment of tissue, 3 to 4 mm. in size, crushed between slides, is both simple and effective in revealing the presence of these eggs. Using this method, the authors have disclosed a higher incidence of schistosomal infection in a series of unselected autopsies in Brazil than has hitherto been found in any comparable series of autopsies.

The authors stress that this method " complements others already in use, but does not substitute for them ". *A. R. D. Adams*

Bibawi, E., El-Deeb, A. A. & Mahfouz, M. M. **The Portal Circulation in Hepatic Fibrosis associated with Bilharziasis.** *Amer. J. Trop. Med. & Hyg.* 1955, Sept., v. 4, No. 5, 913–22, 3 figs. [17 refs.]

The authors studied the effects of schistosomal hepatic involvement on the portal circulation (rate, extent and effects of collateral circulation, and pathological changes in the portal bed).

They report data from 50 cases of hepatic fibrosis associated with *S. mansoni* infection and from 20 persons in whom the liver and spleen were not palpable and the blood count and liver function tests were normal. The diagnosis of hepatic fibrosis was made from biopsy material. Investigations included: examination of stool and urine for *Schistosome* eggs, sigmoidoscopy, blood count, icterus index, thymol turbidity, albumin/globulin ratio, the lobeline systemic circulation time, the ether portal circulation time (EPT), the lobeline spleen-carotid time (SCT), splenic venography and barium swallow.

The EPT is the time between injection of ether vapour into the rectum and its appearance in the expired air. The SCT is the time between the injection of lobeline into a splenic sinusoid and the appearance of the consequent inspiratory gasp or coughing. Modification of the SCT in hepatic fibrosis would depend on the degree of obstruction to blood flow through the liver and the extent of developed collateral circulation.

Of the 50 patients examined 20 had ascites, 27 had collateral veins "developed" in the abdominal wall (more common in ascitic cases), 7 had haematemesis and 15 had varicosities in the aesophagus and stomach. Venous hum occurred in 3 cases.

Normal EPT was 15–25 seconds. In the schistosomal cases it was usually prolonged, occasionally reduced. There was no relation between the EPT and the presence of ascites, the size of the liver or spleen, or the degree of deviation of the function tests.

Normal SCT was 9–13 seconds. In the non-ascitic group it was normal in 17, reduced in 3, prolonged in 2. In those patients with normal or short SCT upon whom splenic venography was performed an abundant collateral circulation was revealed; in those with prolonged SCT it was usually lacking.

Splenic venography usually showed signs of portal hypertension, including splenic and portal venous dilatation and tortuosity. Portal vein thrombosis was present in only one case and splenic vein thrombosis in another. Deep collaterals were visible in 5 cases and filling of the mesenteric veins in one. Diffuse opacity reaching short of the periphery of the liver was seen in advanced cirrhotic cases. The radio-opaque material perfused both lobes, casting doubt on the stream-line theory.

[An interesting and instructive paper. Descriptions of biopsy material, discussion of the results of "function tests" and some more detailed consideration of cases would have been welcome.] *B.G. Maegraith*

Margolis, E. **An unusual Case of Schistosomiasis with special Epidemiologic Aspects.** *J. Parasitology.* 1955, Oct., v. 41, No. 5, 538–41. [15 refs.]

The following case illustrates some of the medical and epidemiological problems caused by the immigration during the last 5 or 6 years into Israel of many persons with schistosomiasis from Yemen, Iraq and elsewhere.

A boy of 18, from Yemen, had been in Israel for 5 years apparently well. He then over a period of 6 months suffered from increasing abdominal discomfort and a bloody diarrhoea, owing to which he steadily lost weight and condition. Examination of the faeces revealed the presence of a *Schistosoma mansoni* infection. This infection almost undoubtedly had been acquired in childhood in Yemen, but it had not caused symptoms and signs until long afterwards. *A. R. D. Adams*

Dias, E. Incidência da esquistossomose mansoni e outras helmintoses no Município de Bambuí, Minas Gerais. [**Incidence of** *Schistosoma mansoni* **and other Helminth Infections in Bambui County, Minas Gerais**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1954, Oct., v. 6, No. 4, 601–5.

A preliminary report on helminth infections in Bambui was published in 1953 [this *Bulletin*, 1954, v. 51, 400]. The results of the examination of a further 4,770 faecal samples are now recorded. Helminth eggs were found in 79·7 per cent. of these samples. The percentage prevalence of helminth species found was *Schistosoma mansoni* 7·8; *Necator americanus* 55·1; *Ascaris lumbricoides* 38·1; *Trichuris trichiura* 7·6; *Taenia* sp. 3·6. The age and sex distribution of positive findings are tabulated.

Norman White

de Andrade, R. M. Alguns dados hidroquímicos de criadouros de planorbídeos no Distrito Federal. [**Chemical Analysis of Breeding Places of Planorbids in the Distrito Federal Area, Brazil**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1954, Oct., v. 6, No. 4, 473–5.

The English summary appended to the paper is as follows:—

"The author presents some observations on chemical analyses on breeding-places of Planorbidae in the Distrito Federal area (Brazil), using the following determinations: pH, total acidity, mineral acidity, chlorinity, total calcic and magnesic hardness.

"1. Snails had been encountered between a large range of 4·0–9·0 pH.

"2. In nearly all analysed samples the total acidity was below 15 ppm $CaCO_3$.

"3. No breeding-places had any mineral acidity.

"4. The maximum chlorid content found was 2 562.00 ppm.

"5. The frequency to encounter snails as well as the density of snail population was proportional to the hardness of the breeding water.

"6. These results represent only a part of a major program in progress, where beside the determinations listed, are examined the sulphates, phosphates, iron, silicone, nitrites, ammonia and organic matter."

Kagan, I. G. & Meranze, D. R. **The Histopathology of Immune and Normal Mouse Skin exposed to Cercariae of** *Schistosomatium douthitti* **(Trematoda: Schistosomatidae).** *J. Infect. Dis.* 1955, Sept.–Oct., v. 97, No. 2, 187–93, 12 figs. on 2 pls. [17 refs.]

"The inflammatory response in the abdominal skin of immune and normal mice following exposure to cercariae of *Schistosomatium douthitti* was studied.

" The inflammatory response after exposure was predominantly heterophilic in character. In immune mice the rate of development and focalization of heterophils was more intense and developed earlier than in normal mice. There was evidence of focalization of small mononuclear cells around cercariae and perhaps the beginning of immobilization of cercariae in the dermis of immune mice after 36 hours of exposure.

" Cercariae sterilized with antibiotics have been introduced in the study of the inflammatory response following exposure to schistosome cercariae. The heterophil response following exposure to sterile cercariae was milder than after use of normal cercariae. The mobilization and focalization of heterophils and small mononuclear inflammatory cells around sterile cercariae indicates that the stimulus for their appearance must be the cercariae or some cercarial product and not foreign contaminants introduced in the train of penetration.

" The cellular response in the skin of immune mice is such that we must conclude that the cercariae of *Schistosomatium douthitti* are not impeded or completely immobilized in their penetration of the skin."

Tálice, R. V. & Pérez Moreira, L. Anomalias multiples de un ejemplar adulto de *Taenia saginata*. [**Multiple Anomalies in an Adult Specimen of** *Taenia saginata*] *Archivos Uruguayos de Med., Cirug. y Especialidades*. 1955, Jan.–Feb.–Mar., v. 46, Nos. 1, 2 & 3, 1–12, 13 figs.

The English summary appended to the paper is as follows:—

" An adult specimen of *Taenia saginata* showing many anomalies is described.

" The following anomalies were recorded:

" 1) Helicoidal disposition of the strobila;

" 2) Unilateral genital openings;

" 3) Hypoplasia of one of the sides of the strobila;

" 4) Some proglottids show two sets of reproductive organs;

" 5) Some proglottids lack of genital papillae;

" 6) Abnormally large and monstrous genital papillae were also observed."

Lewert, R. M. & Lee, C. L. **Studies on the Passage of Helminth Larvae through Host Tissues. III. The Effects of** *Taenia taeniaeformis* **on the Rat Liver as shown by Histochemical Techniques.** *J. Infect. Dis.* 1955, Sept.–Oct., v. 97, No. 2, 177–86, 2 pls.

Meyers, H. F. **Physical Observations on** *Echinococcus* **Eggs, Part I.** *J. Parasitology*. 1955, Oct., v. 41, No. 5, 548–51, 1 fig.

Harada, Y. & Mori, O. **A New Method for culturing Hook-Worm.** *Yonago Acta Med.* 1955, June, v. 1, No. 3, 177–9, 2 figs.

The authors describe a completely new method of culturing hookworm larvae. They take strips of filter paper cut to the same width as, but 2 to 3 cm. longer than, the length of, the testtubes used and smear the faecal material to be examined on to the middle part of each strip of filter paper, leaving 2 cm. of the paper free from faecal material at both ends. The strip of filter paper is then put into the testtube, in which 2 to 3 cc. of water have been put, so that one end of the filter paper is in this water, but a small portion of it, unsmeared with faeces, is above the water. The testtubes are then put in racks into an incubator at 20° to 30°C. The water in the testtube is drawn by capillary attraction up over the whole of the filter paper. After 2 to 3 days the eggs in the faeces hatch and the larvae descend into the water at the bottom of the tube, in which they can be found either by microscopic examination of drops of this water or they can be seen moving in it with the naked eye.

For collecting a large number of the larvae the same method can be used, but a wide-mouthed bottle is then used and the filter paper strips are hung into this from wire bridges at the top. The method can also be used for mass examination of faeces.

The testtubes or bottles should be kept covered from flies. The surfaces of the strips smeared with faeces should not be too wide, nor should the ends of the strips be cut off sharply or they will fluff out and make the water turbid.

Comparing their method with direct microscopy of faeces and with flotation methods, the authors found that, in the examination of 234 patients, the results were;

	Examination of smears	*Flotation methods*	*The authors' method*
Negative patients	205	165	101
Positive patients	29	69	133
Percentages of positives	12.39	29.31	56.83

Thus this method gives a higher percentage of positives and the larvae can be obtained in a fluid free from faecal residue; it does not require either large space or complicated apparatus. *G. Lapage*

del Zoppo, R. Contributo allo studio dell'anchilostomiasi con particolare riguardo alla terapia. (Nota 2ª.) [**A Contribution to the Study of Ankylostomiasis with special reference to Treatment (2nd Note)**] *Nuovi Ann. d'Igiene e Microbiol.* 1955, May–June, v. 6, No. 3, 194–207. English summary. [47 refs.]

In a previous paper (*Nuovi Ann. d'Igiene e Microbiol.*, 1952, v. 3, 124) the author has reported on his investigation into the blood and stools of

57 patients, and he has now seen 31 other cases of ankylostomiasis. For each of 20 of these more recent cases he tabulates names, sex, age, haemoglobin percentage, red cell count, haemoglobin value, differential leucocyte count, sedimentation rate and the average per field of the number of hookworm ova seen in 6 fields. Red cells varied between 4,330,000 and 1,630,000 per cmm. Twelve patients had hypochromia and 7 hyperchromia; anisocytosis and poikilocytosis were met with. The leucocyte count was within normal limits in 15 patients. All patients showed an eosinophilia, in one case as high as 47.5 per cent.; most eosinophils were vacuolated and the author attributes this to the toxic action of the parasite. All but 3 patients had a raised sedimentation rate.

The author found a direct relation between the number of ova and the degree of anaemia. A constant and common complaint was epigastric pain, coming on 1–2 hours after meals. Other common symptoms included heartburn, nausea and vomiting, constipation alternating with diarrhoea and a yellow tinge on the soft palate. Three patients showed no ova in their stools until after they had been given an anthelmintic.

The results of treatment in a total of 88 patients are reviewed in this paper. Twelve patients were cured with thymol given in 5–6 gm. doses 3 times in the course of a month. Under the same treatment, 6 other patients recovered clinically but continued to pass ova: 9 other patients had the same result from 4 gm. doses of carbon tetrachloride taken 3 times in the course of a month. The author believes that re-infection may have taken place in these 15 cases. Nine patients were also given a preparation made up of 6 parts of carbon tetrachloride to 1 part of oil of chenopodium [amounts not stated] 3 times in the course of a month and their stools were free from ova 30–40 days from the first dose.

All 36 cases referred to in the preceding paragraph were mild, the other 52 cases in the series being more severe; 23 of these had the thymol treatment and the other 29 the chenopodium-tetrachloride mixture; the former had to be given as many as 6 times to be effective and often produced vomiting, fever and diarrhoea.

The anaemia in 8 of these 52 severe cases was treated by liver extract alone, with poor results. Fifteen patients were given iron by mouth in addition and 11 of these were completely cured after 60–70 days of this treatment. Twenty-nine patients recovered after 30–70 days of iron given both by mouth and intravenously, the latter route being useful if absorption through the intestinal mucosa is being interfered with by the parasite.

J. Cauchi

Ramanujachari, G. & Alwar, V. S. **A Note on the Occurrence of *Oesophagostomum apiostomum* (Willach, 1891) Railliet and Henry, 1905 (the Simian Nodular Worm) in Indian Monkeys.** Reprinted from *Indian Vet. J.* 1955, July, v. 32, No. 1, 47.

Maki, T.; Yasuda, M.; Narumi, H.; Tanaka, S.; Kikuti, K.; Ichinohe, T. [**Parasitization of** *Trichostrongylus orientalis*. **Report 1. The Results on Middle-School Boys in Tateoka Village**] [Maki, Yasuda, Narumi & Tanaka]. *Hirosaki Med. J.* 1954, v. 5, No. 3, 232–5. [13 refs.] [In Japanese.] English summary *42. [**Report 2. The Results on Middle-School Boys in Fujisaki Town**] [Narumi, Tanaka, Kikuti & Ichinohe]. *Ibid.*, 236–8. [In Japanese.] English summary *43.

In these two studies the authors examined the bile and faeces of apparently healthy schoolchildren in 2 schools in different parts of the Aomori Prefecture of Japan. The bile was examined by Meltzer Lyon's duodenal drainage and the faeces both by the direct method and by that of Fülleborn.

i. In Tateoka village 92 (90·2 per cent.) of 102 schoolchildren were parasitized by *Trichostrongylus orientalis*.

ii. In Fujisaki town, 40 (58·8 per cent.) of 68 schoolchildren were positive for *T. orientalis*.

In both, the percentage of positive findings by the Meltzer Lyon, Fülleborn and direct faecal examinations were respectively 95, 25 to 50, and 10 to 15. The authors therefore consider the duodenal drainage technique to be the method of choice for detecting *T. orientalis* eggs.

The relative findings of the eggs in the bile indicated that simple immigration of these small parasites does not cause signs of cholecystitis, unless the infestation is severe or there is secondary infection.

H.J.O'D. Burke-Gaffney

Passey, R. F. & Fairbairn, D. **The Respiration of** *Ascaris lumbricoides* **Eggs.** *Canadian J. Biochem. & Physiol.* 1955, Nov., v. 33, No. 6, 1033–46, 5 figs. [35 refs.]

Mellanby, Helen. **The Identification and Estimation of Acetylcholine in Three Parasitic Nematodes (***Ascaris lumbricoides***,** *Litomosoides carinii*, **and the Microfilariae of** *Dirofilaria repens*). *Parasitology.* 1955, Nov., v. 45, Nos. 3/4, 287–94, 6 figs. [11 refs.]

Vora, D. D. **Comparative Clinical Study of Anthelmintic Action of Santonin and Intra-Gastric Oxygen against** *Ascaris lumbricoides*. *Indian J. Med. Sci.* 1955, Oct., v. 9, No. 10, 573–8.

" A comparison is made between the two series of patients, comprising 84 and 97 cases who were given treatment with santonin and intra-gastric oxygen respectively. The santonin treatment consisted of giving 5 grains of santonin followed three hours later by a saline purgative; the intra-gastric oxygen was given in dose of 1000 cc. after overnight starvation and

evacuation enema. No purgative was given subsequently. The corrected positive response for the santonin series is 42 per cent, whereas for the intra-gastric oxygen series it is 46 per cent. The worm-clearance rate for intra-gastric oxygen series in the present study is 28 per cent. No serious side-effects were noted with the intra-gastric oxygen therapy, which again confirms the results of a previous study."

[See this *Bulletin*, 1955, v. 52, 806.]

Franco, A. & de Menezes, A. A filaríase autóctona (*W. bancrofti*) na Ilha de Santiago. (Estudo preliminar.) [**Autochthonous** *W. bancrofti* **Infection in the Island of Santiago, Cape Verde**] *Anais Inst. Med. Trop.* Lisbon. 1955, Sept., v. 12, No. 3, 359–93, 1 chart & 24 figs. English summary.

This is a preliminary report of an investigation that the authors are carrying out into the prevalence of filariasis (*Wuchereria bancrofti*) in the island of Santiago, Cape Verde Islands. Cases of elephantiasis, and associated pathological conditions, are frequently seen in and around Pedra Badejo on the eastern coast of the island (Santiago Major): this area was accordingly selected for preliminary enquiry. The almost exclusively Negro population of this area numbers 5,324. Blood samples were collected, between 10 p.m. and 4 a.m., from 962 persons, of both sexes and all age-groups: 265 of these harboured *W. bancrofti*. In one locality, Ponta da Achada, 68 of 144 examined, were infected. The authors consider that the disease has been established in the island for a very long time. There is, however, constant communication between these islanders and places in Africa where filariasis is endemic. The paper is illustrated by several photographs of the terrain and of filarial lesions

Norman White

Neves, H. de A. & Scaff, L. M. Filarioses nas unidades militares sediadas na Amazônia. [**Filariases among Military Units stationed in Amazonia**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1954, Oct., v. 6, No. 4, 533–40.

No town in Brazil has as high a proportion of its population with microfilariae in their blood as has Belém, Pará. In 1951 Deane and Damasceno examined 8,259 persons and found 9·8 per cent. of them with microfilariae of *Wuchereria bancrofti* in the blood [this *Bulletin*, 1954, v. 51, 80]. The authors of the present report give reasons for believing that that figure was an underestimate and that not fewer than 20 per cent. of Belém's population are infected. Their investigation carried out on behalf of the National Malaria Service into the incidence of filariasis in the personnel of units of the 3 fighting services stationed in Amazonia was carried out in collaboration with the medical officers of the services concerned.

In the 4th Naval District, Pará, 1,250 persons were examined of whom 650 were civilian employees: 21 per cent. of the civilians and 10 per cent. of the naval personnel were infected. The much higher rate among the civilians is due to the fact that they are nearly all born in Pará and live in insanitary dwellings much more exposed to mosquitoes.

During 4½ years up to May 1954 4,282 persons were examined in the medical post and hospital of the Air Base of Belém: 3·3 per cent. of them had microfilariae of *W. bancrofti.*

In 1954 a blood examination was made of 1,223 men called up for military service; microfilariae of *W. bancrofti* were found in 11·3 per cent.

During 1954, blood examinations were carried out of troops stationed at posts in Amazonia close to the frontiers of Peru, Colombia, Venezuela and Bolivia. Of the 52 positive findings in these examinations (12·9 per cent.) 44 were *Mansonella ozzardi*, 7 *W. bancrofti* and one mixed infection. *M. ozzardi* is of doubtful pathogenicity.

In the treatment of *W. bancrofti* infection Hetrazan [diethylcarbamazine] has given good results. *Norman White*

Rachou, R. G., Lôbo, A. G. S. & Martins, Josélia S. Primeiras investigações do Serviço Nacional de Malária relativas à incidência da filariose bancroftiana no Estado do Paraná. [**Preliminary Investigations of Incidence of** *Wuchereria bancrofti* **Infection in Paraná, Brazil**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1954, Oct., v. 6, No. 4, 477–9.

The English summary appended to the paper is as follows:—

"Examining the blood of 8,658 persons, distributed by 10 localities of Paraná State (Brazil), the authors did not find any case of microfilariaemia of *W. bancrofti.*"

Rachou, R. G., Lacerda, N. B. & Costa, A. Inquérito hemoscópico para pesquisa de microfilárias em Pôrto Velho, Capital do Território do Guaporé. [**Haematological Survey for Detection of Filariasis at Pôrto Velho, Guaporé, Brazil**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1954, Oct., v. 6, No. 4, 501–3.

The English summary appended to the paper is as follows:—

"The hemoscopic survey for filariasis made at Pôrto Velho, Capital of the Territory of Guaporé, revealed 6 persons with microfilariae of *W. bancrofti*, among 1,400 examined persons; all cases were imported. The microfilariae were unsheathed; the specific diagnosis has been based on the distribution of the somatic nuclei, characteristic of this species, and on the procedence of the cases, Belém, where *W. bancrofti* is the only existing species of filaria."

Rachou, R. G., Ferreira, M. O. & Lima, M. M. Investigações relativas à incidência da filariose bancroftiana na Ilha de Santa Catarina. [**Survey of Incidence of** *Wuchereria bancrofti* **Infections in Santa Catarina Island, Brazil**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1954, Oct., v. 6, No. 4, 519–23, 1 map.

The English summary appended to the paper is as follows:—

"The authors present the results of a survey carried out to ascertain the incidence and transmission of bancroftiasis in Santa Catarina Island (South of Brazil). 0·5% of 13,340 examined persons presented microfilariae of *W. bancrofti*; from each person a sample of 20 c.mm. of blood was taken at night, between 19 and 23 p.m. *Culex fatigans* was the only species of mosquito harboring larvae of that filaria, in the 3 localities where entomological researches were made; in one locality this species has been found with infective larvae. The hemoscopic survey has been made in 28 localities, in 6 of which were found persons with microfilariae. In general the incidence of bancroftiasis in the island is very low, with exception of Ponta Grossa, with a microfilaria rate of 13·9%, and part of Florianópolis City, where this index has been 3·4%."

Rachou, R. G., Lima, M. M. & Neto, J. A. F. Levantamento preliminar de criadouros de *Culex fatigans* em Floriãnópolis (Estado de Santa Catarina). [**Preliminary Survey of Breeding Places of** *Culex fatigans* **in Florianópolis, Brazil**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1954, Oct., v. 6, No. 4, 497–500.

The English summary appended to the paper is as follows:—

"An entomological survey to determine the breeding-places of *Culex fatigans* was carried out in Florianópolis (Santa Catarina State). From 17,594 examined water collections, 311 (1·8%) presented larvae of this species of mosquito. A low larval density has been registered."

Subramaniam, R. & Srinivasan, K. **Therapy in Filariasis.** *J. Indian Med. Ass.* 1955, Sept. 1, v. 25, No. 7, 257–61.

The authors report on the treatment of patients with elephantiasis and other manifestations of infection with *W. bancrofti.* Patients treated totalled 161 and were divided into four groups. In Group 4, containing only 5 patients, Spirochin hydriodide only was given. This was not found to be of any value. Groups 1 and 2 were given weekly subcutaneous injections of 1 ml. of 1 per cent. sodium fluoride (mixed with 1 ml. of 2 per cent. procaine hydrochloride) in combination with sulphanilamide or pentavalent antimony, respectively. In Group 3 piperazine compounds alone were administered. Piperazine freed the blood of microfilariae and is considered to be of value in early cases. Sulphanilamide was found to

be effective in controlling pain and fever. Pentavalent antimony was not found to be of value. An elastic crêpe bandage was found to help to reduce the swelling of limbs.

The authors believe that sodium fluoride acts as a fibrolysin and brings about softening and shrinkage in a considerable proportion of cases of elephantiasis. It has no effect on circulating microfilariae.

[It is not clear that the groups were comparable and the claims made for sodium fluoride do not appear to be fully substantiated. It is reported that elephantiasis is infrequent in areas where fluorosis is endemic.]

Frederick J. Wright

Edeson, J. F. B., Wharton, R. H. & Buckley, J. J. C. **Filarial Parasites resembling *Wuchereria malayi* in Domestic and Forest Animals in Malaya.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, Nov., v. 49, No. 6, 604–5.

Poynton and Hodgkin reported the finding of a microfilaria indistinguishable from that of *Wuchereria malayi* in a Kra monkey (*Macaca irus*) in Malaya [this *Bulletin*, 1939, v. 36, 839]. The microfilariae developed readily in the 3 normal *Mansonia* vectors of *W. malayi* and the mature larvae were also indistinguishable from those of human origin. Attempts to infect monkeys with larvae of human *W. malayi* were not successful [*ibid.*, 1941, v. 38, 153].

The present authors, in Malaya, have now confirmed the presence in the monkeys of a sheathed microfilaria resembling that of *W. malayi* and developing readily in *Mansonia* mosquitoes. The infection rate was much lower than that in man (3 of 55 monkeys compared with 41 per cent. of some 4,000 Malays in the endemic area).

More unexpectedly, such microfilariae were found in 2 other forest and 2 domestic animals, namely 3 of 20 specimens of the slow loris, *Nycticebus coucang*; one banded leaf-monkey, *Presbytis melalophos*; 4 of 5 domestic dogs; and 12 of 31 domestic cats.

Adult *Wuchereria* worms have been recovered from the lymphatics of the Kra monkey, dog and cat. At least 2 species are involved, one clearly distinct from *W. malayi* and found in a dog and a cat, the other closer to *W. malayi* of man and found in the Kra and (?) a cat. During experimental feedings with *Mansonia longipalpis*, *M. uniformis* and *M. annulatus* differences in developmental pattern were noted: development of the microfilariae from man, Kra, and one cat followed a similar and predictable pattern in these 3 extremely efficient laboratory hosts; on the other hand, *M. longipalpis* and (to a lesser extent) *M. uniformis* were inefficient hosts for the dog, one cat and loris infection, while *M. annulatus* was still an efficient vector. Larval development was confined to the thoracic muscles and the mature larvae would appear to be indistinguishable.

These are preliminary findings and the relationship of these infections

to human filariasis cannot yet be assessed: but the authors stress their possible importance as reservoir infections. These findings represent the first real opportunity of establishing in the laboratory a filarial infection closely related to one of man and the value of this for study purposes is obvious. At the same time the authors point out that the results of field dissections for filarial larvae have become even more confused than before, since the origin of any *malayi*-like larvae is now in doubt.

H.J.O'D. Burke-Gaffney

Webber, W. A. F. *Dirofilaria aethiops* **Webber, 1955, a Filarial Parasite of Monkeys. I. The Morphology of the Adult Worms and Microfilariae.** *Parasitology.* 1955, Nov., v. 45, Nos. 3/4, 369–77, 12 figs.

Hawking, F. & Webber, W. A. F. *Dirofilaria aethiops* **Webber, 1955, a Filarial Parasite of Monkeys. II. Maintenance in the Laboratory.** *Parasitology.* 1955, Nov., v. 45, Nos. 3/4, 378–87, 1 fig.

Webber, W. A. F. *Dirofilaria aethiops* **Webber, 1955, a Filarial Parasite of Monkeys. III. The Larval Development in Mosquitoes.** *Parasitology.* 1955, Nov., v. 45, Nos. 3/4, 388–400, 16 figs.

Webber, W. A. F. & Hawking, F. **The Filarial Worms** *Dipetalonema digitatum* **and** *D. gracile* **in Monkeys.** *Parasitology.* 1955, Nov., v. 45, Nos. 3/4, 401–8, 7 figs.

Ramanujachari, G. & Alwar, V. S. **Parafilariasis (?) of Elephants.** Reprinted from *Indian Vet. J.* 1954, July, v. 31, No. 1, 37–40, 1 fig.

Ramanujachari, G. & Alwar, V. S. **Further Observations on Parafilariasis (?) of Elephants.** Reprinted from *Indian Vet. J.* 1954, Nov., v. 31, No. 3, 206–9, 4 figs. on pl.

Reinertson, J. W. & Thompson, P. E. **Effects of JGS-110 (N,N-Diethyl-4-Methyl-1,4-Diaza-Cycloheptane-1-Carboxamide, Hydrochloride) against Filariasis in Cotton Rats.** *Antibiotics & Chemotherapy.* New York. 1955, Oct., v. 5, No. 10, 566–70, 1 fig.

"The intraperitoneal administration of JGS-110 into cotton rats infected with *Litomosoides carinii* caused a reduction in the numbers of

microfilariae in the circulating blood but it failed to kill the adult worms at doses up to eight times the level that suppressed the blood infection. Parallel comparison with diethylcarbamazine intraperitoneally showed that JGS-110 is one-fourth to one-half as active as this drug against microfilariae and is probably about one-half as toxic acutely for mice.''

Schofield, F. D. **Two Cases of Loiasis with Peripheral Nerve Involvement.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, Nov., v. 49, No. 6, 588–9.

Kivits [this *Bulletin*, 1953, v. 50, 52], in the Belgian Congo, mentioned fleeting neuritic pain among the symptoms of loiasis. The present author, from the Hospital for Tropical Diseases, London, gives details of more severe and persistent damage to peripheral nerves in 2 Europeans who had worked in Nigeria for several years.

The first patient had had swellings of the left forearm, and later in the legs, intermittently between 1947 and 1949. Treatment with Banocide [dimethylcarbamazine] caused the symptoms to disappear until 1951. The swellings then recurred, but without neuritic symptoms.

In May 1954, a Calabar swelling was found on the left forearm. The blood contained microfilariae of *Loa loa* and *D. perstans*, eosinophils amounted to 38 per cent. and filarial skin and complement-fixation tests were positive.

Banocide was given in low dosage (0·5 mgm./kgm.) and next day pain and brawny oedema appeared in the right forearm, which hitherto had not been affected. There was hypoaesthesia over the right ulnar nerve area on the hand. The drug was reduced and next day a live adult *L. loa* was removed from the conjunctiva of one eye.

Ten days later the pain and swelling in the forearm had subsided, but definite weakness of the affected digital muscles was present. X-ray of the arms and hands showed no abnormalities. The dosage of Banocide, which had been reduced, was slowly increased to 3 mgm./kgm. and at this time, 17 days after the beginning of treatment, the eosinophilia was 78 per cent. Treatment was stopped 2 weeks later and the ulnar sensory loss and motor weakness were unchanged. This had improved but had not completely resolved 6 weeks later. The patient had difficulty in picking up small objects and in playing the piano. The eosinophilia was now 19 per cent. and no embryos were found in the day blood.

The second patient had had intermittent pain in the right wrist in 1953 and, since early 1954, similar pains in the ankles. In July of that year a swelling appeared for one day on the left forearm, and in August on the right hand and forearm. This was accentuated by exercise and never disappeared completely. In September numbness appeared in the middle 2 fingers of the right hand. There was a brawny swelling of the right hand and forearm and marked hypoaesthesia over the distribution

of the palmar and digital branches of the median nerve, with weakness of the small muscles of the thenar eminence, inability to oppose the thumb and weakness of flexion of the fingers and thumb. The skin and complement-fixation tests were strongly positive, eosinophilia was 29 per cent., but no microfilariae were found.

The swelling and neuritis improved rapidly after a course of Banocide and had disappeared within a month, by which time the eosinophilia was 5 per cent.

The author notes that no case of toxic neuritis due to Banocide has been recorded and suggests that these manifestations were allergic reactions due to death or encystment of *L. loa* in close anatomical proximity to the ulnar and median nerves respectively.

H. J. O'D. Burke-Gaffney

Duke, B. O. L. **Studies on the Biting Habits of *Chrysops*. II.—The Effect of Wood Fires on the Biting Density of *Chrysops silacea* in the Rain-Forest at Kumba, British Cameroons.** *Ann. Trop. Med. & Parasit.* 1955, Oct., v. 49, No. 3, 260–72, 3 figs.

This paper shows that the presence of smoke from a wood fire greatly increases the biting rate of *Chrysops silacea* on bait-boys. In 9 days' catching at 4 stations at ground level in the presence of wood-fire smoke the numbers of flies caught were 142, 198, 202, and 183. Corresponding figures at stations not affected by smoke were 21, 37, 41, and 18 flies. Other data for longer catching periods are 183 and 445 flies in the presence of smoke but only 18 and 72 in its absence. The difference is most pronounced during the morning. In general, the biting rate for the day is increased sixfold by smoke. By placing a fire above the forest canopy, in the canopy, and at 28 feet and ground level on different days it was shown that the fire is appreciated only by flies some distance above it. It seemed possible that the upward movement of the blue smoke of a ground fire was a visual stimulus to flies in the canopy, but neatly controlled tests with a blue banner suspended from the lower canopy to the ground discounted this possibility. Further tests with large Primus stoves instead of wood fires eliminated simple heat effects, and possibly carbon dioxide, as the stimulus. Next, comparisons of wood fires and fires of tarred sisal rope soaked in dirty engine-oil and kerosene revealed that only the wood fire attracted flies appreciably. Addition of some leaves to the dirty grey-white smoke of the unsavoury fire of rope and oil, giving a perceptible wood smoke scent to it, resulted in a significant rise in the biting rate of *Chrysops*. An olfactory stimulus is apparently involved. *C. dimidiata* is also taken in the presence of wood-fire smoke but not other species.

The smoke from wood fires in African and European houses may be important in attracting *Chrysops* from the forest to feed in the houses. The aroma of smoke from the African body which is sometimes very

appreciable may be a factor in selective attack by *Chrysops*. [See also this *Bulletin*, 1955, v. 52, 1124.] *D. S. Bertram*

Chartres, J. C. **Onchocerciasis: Incubation Period, Clinical Course, and Treatment at First Hand.** *West African Med. J.* 1955, Sept., v. 4, No. 3, 130–35. [12 refs.]

The author gives an accurate and detailed account of onchocerciasis acquired by himself and his wife from an exposure, of 1¼ hours, to the bites of *Simulium damnosum* when crossing a river by a ferry-boat manned by paddlers exhibiting onchocerca nodules. There was a similar but shorter exposure 3 weeks later. The incubation periods were 15 and 18 months respectively. The initial lesions were papular rashes, later with urticaria. At one time the author's rash was limited for 1½ months to the left forequarter and puzzled dermatologists. Two and a half years after infection, eosinophilia was present in both (*D. perstans* larvae in a thick blood film of the author), filarial antigen test positive in both, skin biopsy (author only) negative. Mazzotti's test [diethylcarbamazine (Banocide) 4 × 50 mgm. tablets by mouth daily for 2 days] produced a severe reaction in the author and a moderate one in his wife. Banocide failed in treatment but both patients were cured by intravenous Antrypol. A nodule appeared in each patient after treatment, and in one a necrotic worm resembling *O. volvulus* was found. [A vivid authentic account of considerable value.] *Frederick J. Wright*

Nugent, D. A. W., Scott, D. & Waddy, B. B. **Effect of Water-Point Treatment with DDT on the Incidence of Guinea Worm Infection.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, Sept., v. 49, No. 5, 476–7.

A guineaworm survey was carried out in a district of north Ashanti in 10 village communities entirely dependent on perennial ponds for water; an incidence of 24 per cent. was revealed in a population of 1,236. Control was attempted by adding wettable DDT to the ponds at a concentration of 10 parts per million of water. Surveys were repeated one year and two years later. One village did not receive the treatment because a well was being provided, and in the others only one treatment with DDT was given but wells were sunk in 4 of the villages between the first and third surveys.

The results are given in a table. In 5 villages, the water supplies of which received only the single DDT treatment, the incidence of infection on the first occasion and in the two successive annual surveys was 30 per cent., 6·4 per cent. and 10 per cent. respectively. In two villages where the water was treated with DDT and wells were provided between the

second and third surveys, the incidence fell from 17 per cent. to 5·2 per cent. and finally to 4 per cent. In two villages in which the ponds were treated with DDT but wells were provided between the original and the second survey the incidence fell from 4 per cent. to 1 per cent. and finally to 0 per cent. Finally, in the village where DDT treatment was not employed but a well was provided soon after the first survey, the guinea-worm incidence, which was originally 28 per cent., dropped to 2·4 per cent. and then rose to 8 per cent. In the 7 villages included in the first two groups the incidence fell from 26·5 to 6 per cent. in one year, suggesting an effect of DDT on *Cyclops*, which was supported in the case of one of the groups by the subsequent rise to 10 per cent. a year later when activity of the chemical had probably declined. In two of these villages, however, little improvement was noted, possibly because of inefficient application of the chemical. The rise in guineaworm incidence after an initial fall in the village which had a well provided but no DDT treatment, was difficult to explain. It may have indicated a general and unexplained decrease during one year over the whole area.

It is suggested that on account of its simplicity the use of DDT to control *Cyclops* in ponds used for the supply of water is worthy of further trial in rural areas where the provision of wells or piped supplies is likely to be delayed. *T. H. Davey*

Cavier, R. & Gaulin, J. Un nouvel anthelminthique: le dilaurate de diéthylène-diamine. [**A New Anthelmintic: Dilaurate of Diethyl-Diamine**] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 3, 393–6.

Seeking less soluble and more active derivatives of diethylene-diamine, which would be tolerated better by patients than other derivatives of this substance, the authors tested some of its saturated combinations with fatty acids by *in vitro* tests on cultures of *Rhabditis macrocerca* and *in vivo* tests on oxyurids of mice treated once a day for 7 days *per rectum* with 0·75 cc. of a solution of the product tested. On the 8th day they counted the oxyurids living in the caecum. The minimum daily dose capable of killing all the worms was determined.

The results showed that the fatty acids increased the anthelmintic action of diethylene-diamine. Tests of the toxicity of the dilaurate and of the base diethylene-diamine itself showed that the toxicity of the former was very low and the authors tested it clinically on 30 children suffering from enterobiasis and on 10 children with ascariasis.

The children were divided into 2 groups, of which one was treated by the mouth only and the other by the mouth with the addition of suppositories. The dilaurate of diethylene-diamine was given in sugar-coated granules to avoid its disintegration in the proximal parts of the digestive tract. One dose of 0·36 gm. of the dilaurate per day for 3 days was given

to children fasting in the morning. The children who also had suppositories were given one of these containing 0·05 gm. of the drug in the evening on going to bed for 3 days. After a rest for 2 weeks, a second course of treatment was given.

Of the 30 patients with enterobiasis, 28 were cured, 20 of these having been cured after one course of treatment. Of the 10 patients with ascariasis 6 were cured, 3 after one course of treatment.

It was interesting that the single oral dose sufficed to cure and that children receiving it were cured in the same time as those who also had suppositories. Tolerance of the drug was remarkably good, no side-effects being observed.

Thus dilaurate of diethylene-diamine is effective, especially for enterobiasis; it is tolerated perfectly, even by young children; its chemotherapeutic index is very low; and this allows relatively high doses to be given without regard to weight or age of the child. The drug is so feebly absorbed by the digestive tract that oral administration is sufficient; it therefore deserves a place in the anthelmintic armoury. *G. Lapage*

Rawson, G. W., Ferrell, B. D., Reynolds, A. C. & Mayer, R. L. **The Activity of Thionocarbanilates including *n*-Butyl-*p*-Allyloxy Thionocarbanilate against Mouse Pinworms.** *Antibiotics & Chemotherapy.* New York. 1955, Nov., v. 5, No. 11, 622–8. [11 refs.]

"Among a number of related thionocarbanilates studied for antipinworm activity in mice, *n*-butyl-*p*-allyloxy-thionocarbanilate (Su 2434) demonstrated particularly good activity against these parasites. This substance possesses a low degree of peroral toxicity and a relatively wide margin of therapeutic safety."

Stoner, R. D. & Hankes, L. V. **Incorporation of C^{14}-Labeled Amino Acids by *Trichinella spiralis* Larvae.** *Exper. Parasit.* New York. 1955, Sept., v. 4, No. 5, 435–44. [17 refs.]

Marcus, S. & Miller, R. V., Jr. **An Atypical Case of Trichinosis with Report of Electromyographic Findings.** *Ann. Intern. Med.* 1955, Sept., v. 43, No. 3, 615–22, 2 figs. [16 refs.]

"An unusual case of trichinosis is presented. Trichinella skin tests were negative initially but became positive seven months later. Electromyograms, never before reported to our knowledge in trichinosis, disclosed extensive fibrillation. The significance of these findings is discussed."

DEFICIENCY DISEASES

World Health Organization. Technical Report Ser. No. 97. **Joint FAO/WHO Expert Committee on Nutrition. Fourth Report.** Geneva, 26 October–2 November 1954. 58 pp. [Refs. in footnotes.] Geneva: 1955, July. [3s. 6d.; $0.60; Sw.fr. 2.–.] [Issued also as *FAO Nutrition Meetings, Report Series, No. 9.*] [Sales agent for U.K., H.M. Stationery Office.]

This joint FAO/WHO Committee was established in 1950 " to advise the Directors-General of FAO and WHO on the problems of nutrition which might receive the attention of the two organizations and to assist in co-ordinating their respective programmes in this field ". The Committee consisted of 10 persons, 5 appointed by FAO and 5 by WHO, and the appropriate staff from the Secretariats. The members came from the U.S.A. (3), the U.K. (2), France, the Netherlands, India, the Philippines and Venezuela and represented well the diverse aspects of nutrition. The first 18 pages are a report from the Secretariats of the nutrition work carried out by the two organizations in the recent years and an outline of a future programme. The Committee discussed this and reported under 12 heads: 1. Requirements for calories; 2. Requirements for proteins; 3. Protein-rich foods for feeding infants and children; 4. Enrichment of dried skimmed milk with vitamins A and D; 5. Additives to food; 6. Education and training in nutrition; 7. Pellagra; 8. Endemic goitre; 9. Nutrition and degenerative diseases; 10. Anthropometry applied to nutrition; 11. Assessment of nutritional states; 12. Nutritional aspects of the welfare of the aged.

The report is essentially a working guide for the Secretariats and their staffs, but the general reader will find within much useful information about the problems of nutrition throughout the world and details of how the United Nations agencies are trying to tackle them.

There are 2 annexes dealing respectively with methods and content of education in nutrition, and the FAO technical assistance programme in nutrition, food technology and home economics. *R. Passmore*

Demaeyer, E. M., Chardome, M. & Peel, E. Enquête parasitologique et variations de la protéinémie en fonction de l'altitude chez les indigènes de la région de Katana-Lwiro. [**Examination for Parasites and Variations in Serum Protein as Functions of Altitude in Africans of the Katana-Lwiro Area**] *Ann. Soc. Belge de Méd. Trop.* 1955, June 30, v. 35, No. 3, 293–313, 4 figs. [21 refs.]

West of Lake Kivu in Ruanda-Urundi are several mountain ranges running more or less parallel with the western border of the lake. The authors have studied members of the Bashi community who live there at distinctly different altitudes, one group living at the lake shore 1465

metres (4800 feet) above sea level, another living in villages somewhat higher up in the mountains at 1700 metres (5500 feet), and a third living at a still higher altitude of 2000 metres (6500 feet).

These people are genetically homogeneous; the great majority are agricultural, living on their own produce; only a few of the people living at the lake shore supplement their food with fish. The total calorie intake is generally adequate but there is little consumption of animal protein. Perhaps the people living at the lowest altitude have slightly more meat, fish and milk than the other two groups. The climatic conditions are also very much alike, except that the mean temperature falls with higher altitude.

From all 3 groups adults aged from 20 to 40 years were chosen for examination. Grossly ill people or pregnant women were excluded, otherwise the selection was at random. From the lowest group 195 were examined, from the intermediary 129, and from the highest altitude 65 were examined for malaria and filariasis; 172, 101 and 49 respectively were investigated for infection by intestinal parasites. The haemoglobin level, the red and white cell counts were determined in 43, 91 and 42 subjects, and the serum protein (total, albumin, total and gamma globulin) in 44, 94 and 57 respectively. There were no striking differences in filariasis and infection by intestinal parasites. Ascariasis was found in 74, 78 and 67 per cent. respectively, but ankylostomiasis was present only in 5, 2 and 2 per cent. The white cell count also was similar in the 3 groups. The serum protein was also similar in the 3 groups, except the serum albumin level which was somewhat higher at the higher altitudes, but this difference was only just statistically significant. In all 3 was seen a low serum albumin and a high globulin, the rise in the globulin fraction being caused by an elevation of the gamma globulin. On the other hand the haemoglobin level, the red cell count and the malarial index varied considerably with altitude. The mean values were as follows:

Altitude (feet)	Malarial Index (%)	Haemoglobin (gm. %)	Red Cell Count million/cmm.	Serum Albumin gm. %
4800	16·9	13·3	3·84	3·2
5500	8·5	14·4	4·20	3·2
6500	3·6	16·0	4·67	3·6

Living at higher altitudes does of course always cause a rise in red cell count and haemoglobin level, but the differences seen by the authors are too great to permit this explanation. The formula usually applied for

correction of cell count for altitudes is as follows. Altitude in metres x 738 = rise in red cell count (million/cmm.). Thus a cell count of 4·67 million/cmm. at 6500 feet (2000 metres), should only fall to 4·45 million/cmm. at 5500 feet (1700 metres), and to 4·28 million/cmm. at 4800 feet (1465 metres).

Thus, though a normochromic anaemia is present in all 3 groups, this anaemia is more pronounced at lower altitude and with a higher malaria rate.

The general anaemia (even 16 gm. per cent. haemoglobin is " anaemic " at 6500 feet above sea level) is thought to be due to the lack of animal protein in the diet of all 3 groups. This explanation would also account for the low serum albumin and the high globulin. Superimposed on this general picture of nutritional imbalance is the effect of malaria which lowers still further the haemoglobin level and the serum albumin concentration in the people living at the lower altitudes. *H. Lehmann*

Lacroix, A. C. Le myo-oedème socio-physiologique. Son intérêt dans la connaissance des états collectifs de malnutrition. [**Sociophysiological Myo-Oedema. Its Significance in the Recognition of Collective States of Malnutrition**] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 2, 185–91, 3 figs. [23 refs.]

Myo-oedema can be demonstrated in the recumbent patient by picking up between the index finger and thumb the mass of the biceps muscle in the lower third of the arm and rapidly twisting it. A transverse ridge 2 to 3 mm. high persists in positive cases for 2 to 4 seconds after withdrawal of the hand. This phenomenon has been known to physiologists since 1797, but its significance is not yet elucidated. The sign is very easily elicited in large numbers of Algerians. It is probably associated with a nutritional disequilibrium. The value of the clinical sign in collective diagnosis is discussed, but no definite conclusion is drawn.

R. Passmore

Patwardhan, V. N. **Genesis of Nutritional Oedema.** *Indian Med. Gaz.* 1954, Dec., v. 89, No. 12, 736–42, 2 figs. [25 refs.]

This is a useful and well-documented brief review of an interesting subject. It is pointed out that in the American and European literature polyuria is stated to be a frequent early feature of the oedema. By contrast, in Indian patients oliguria is the rule. Whereas McCance and others in Europe have found a normal response to water and salt load tests, Indian observers have found an impaired ability of the kidneys to excrete excess water and salt. Indian workers [Gopalan *et al.*, this *Bulletin*, 1954, v. 51, 715] have produced evidence that suggests an increase in intracellular water in famine oedema. *R. Passmore*

VAN STEENIS, P. B. **Liver Cirrhosis.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1955, Sept., v. 7, No. 3, 252–8.

This paper gives a clinical account of the problems of tropical liver cirrhosis. The difficulties that may arise in diagnosis are discussed. With adequate treatment (a dietary rich in protein and poor in fat) the prognosis may be much more favourable than is usually stated. A detailed case history is given of a Dutchman who suffered severe privations during the Japanese occupation. He was repatriated to Holland and at a laparotomy in 1949 he was found to have a marked cirrhosis of the liver of the Laënnec type. He has been followed for 5 years in Holland and during this time has had few complaints, has never been off work and has gained weight. No sign of portal congestion has developed. Several other patients who developed liver cirrhosis in the Far East have remained well and at work without portal congestion for a similar period. *R. Passmore*

ZUIDEMA, P. J. **Calcification and Cirrhosis of the Pancreas in Patients with Deficient Nutrition.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1955, Sept., v. 7, No. 3, 229–51, 7 figs. [Numerous refs.]

Indonesian patients with pancreatic calcification are described. There were 4 males and 3 females, aged between 18 and 28. In 6, diabetes mellitus dominated the clinical picture and in only one was epigastric pain a prominent feature. The diabetes was usually very resistant to insulin and not associated with ketosis. In none could a deficiency of the external secretions of the gland be demonstrated and steatorrhea was not a feature. No patient gave a history of alchoholism. The condition thus differed in many ways from pancreolithiasis as described in European and American literature.

All the patients came from poor peasant families and had been subsisting on diets low in protein. Some showed a marked swelling of the parotid glands. It is suggested that a chronic deficiency of protein may lead to a severe degenerative condition of the pancreas. Only one autopsy specimen was examined microscopically (in the other patients, the diagnoses were made by X-ray examination) and there was marked fibrosis of the whole pancreas with much fatty infiltration and degeneration of the glandular tissue; calculi were seen in many ducts. This patient had also a well-developed hepatic cirrhosis. Circumstances prevented accurate assessment of liver function in the other patients. [This is a very well documented account of a condition with which most physicians in the tropics are not familiar.] *R. Passmore*

HAEMATOLOGY

Welbourn, Hebe F. **Haemoglobin Estimations in African Children attending Child Welfare Clinics.** *East African Med. J.* 1955, Oct., v. 32, No. 10, 401–4, 1 graph. [10 refs.]

The author published in 1952 results of a haemoglobin survey which show very low levels in African children in the vicinity of Kampala [this *Bulletin*, 1953, v. 50, 60]. These findings were different from those of Jordan [*ibid.*, 1954, v. 51, 1093] who at the southern shore of Lake Victoria found the haemoglobin levels of children (provided they had no malaria parasites in their peripheral blood) to be similar to those seen in British children. On re-examining the Kampala children the author now finds that the haemoglobin levels are in fact more like those found by Jordan than those reported by her in 1952. The explanation is the use of a faulty haemoglobinometer when the first series of children was investigated. Though disturbances of nutrition are common in Baganda children during the weaning period they are not accompanied by lowered haemoglobin levels; children with malaria parasites in the peripheral blood, however, show a significant anaemia. *H. Lehmann*

Woods, J. D. & Rymer, J. J. H. **Pernicious Anaemia in the South African Bantu.** *Lancet.* 1955, Dec. 17, 1274–5.

"A case of pernicious anaemia and subacute combined degeneration of the spinal cord in a pure-bred South African Bantu woman is described.

"The patient's neurological disorder deteriorated during treatment with folic acid but greatly improved when instead vitamin B_{12} was administered."

Esmond, W. G., Quinn, C. L. & Peters, H. R. **Hereditary Spherocytosis in a Negro Family. Report of Three Cases.** *Amer. J. Dis. Children.* 1955, Oct., v. 90, No. 4, 407–10. [10 refs.]

"Three new cases of hereditary spherocytosis in a Negro family are presented. Each patient in this series presented with the sudden development of anaemia due to an aregenerative erythroid crisis probably due to a viral agent.

"Hereditary spherocytosis should be considered in the work-up of Negro patients with hemolytic disease even if sickling or abnormal hemoglobins are demonstrated.

"The spleen may not be palpable in a patient with hereditary spherocytosis in an aregenerative crisis."

Rizzotti, G. Falcemia e malattia falcemica. Prime osservazioni circa la loro diffusione nella regione di Addis Abeba. [**Sickling and Sickle-Cell Anaemia. First Survey in the Addis Ababa Region**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1955, Oct., v. 36, No. 10, 555–63. [28 refs.]

The English summary appended to the paper is as follows:—

"After having dealt, in general, with the sickle cell disease and the sickle cell anemia and their diffusion as regards to the race of the patients, the author reports his investigations on the sickle cell trait in Addis Abeba. He refers that his researches on 154 individuals gave constantly negative results and suggest the absence or scarcity of people with the sickle cell trait may be due to the anoxemia induced by altitude."

Kraus, Lorraine M. & Morrison, D. B. *In vitro* **Incorporation of Iron-59 into Hemoglobin S visualized by Autoradiography.** *Proc. Soc. Exper. Biol. & Med.* 1955, Aug.–Sept., v. 89, No. 4, 598–602, 4 figs.

Vandepitte, J. & Colaert, J. Un cas de syndrome falciforme dû à l'interaction de deux hémoglobines anormales C et S. [**A Case of Sickling due to Interaction of Haemoglobins C and S**] *Ann. Soc. Belge de Méd. Trop.* 1955, Aug. 31, v. 35, No. 4, 457–64, 4 figs. on 4 pls. [25 refs.]

Huisman, T. H. J., van der Schaaf, P. C. & van der Sar, A. **Some Characteristic Properties of Hemoglobin C.** *Blood.* 1955, Nov., v. 10, No. 11, 1079–91, 5 figs. [22 refs.]

EPIDEMIC DROPSY

Rama, K. P. **Polyvinyl-Pyrrolidine in Epidemic Dropsy.** *J. Indian Med. Ass.* 1955, Nov. 1, v. 25, No. 11, 452.

"1. Three patients in the same family with history of taking mustard oil developed a group of signs and symptoms which led to the diagnosis of epidemic dropsy.

"2. In one patient the condition became very alarming and 6 per cent polyvinyl-pyrrolidine was found to be a life saving measure. It was found to be of great value in two other patients for clearing up the signs and symptoms."

VENOMS AND ANTIVENENES

Vital Brazil, O. & Barrio, A., Jr. Acción curarizante de las ponzoñas de *Elapidae*. I. Fenómenos de inhibición y facilitación en la unión nueromuscular. [**Curarization Effect of the Venoms of Elapidae. I. Phenomena of Inhibition and Facilitation at the Neuromuscular Junction. II. Effect of Some Antagonists of Curare**] *Rev. Inst. Malbrán.* Buenos Aires. 1954, v. 16, No. 1, 1–10, 10 figs. on 5 pls. [19 refs.] II. Effectos de algunos antagonistas del curare. *Ibid.*, 11–18, 7 figs. on 4 pls. [13 refs.]

Barrio, A., Jr. & Vital Brazil, O. Acción neuromuscular de los venenos de *Crotalus terrificus terrificus* (Laur.). [**Neuromuscular Action of the Venoms of** *Crotalus terrificus terrificus*] *Rev. Inst. Malbrán.* Buenos Aires. 1954, v. 16, No. 1, 22–40, 11 figs. on 10 pls. [32 refs.] English summary.

Barrio, A., Jr. Variaciones en el contenido de riboflavina y l-ofi-aminoácido-oxidasa en venenos de Crotalidae de la Argentina. [**Variations in the Content of Riboflavin and 1-ophi-amino-acid-oxidase in the Venoms of Crotalidae in Argentina**] *Rev. Inst. Malbrán.* Buenos Aires. 1954, v. 16, No. 3, 204–14, 1 diagram. [31 refs.] English summary.

Barrio, A., Jr. Estudio electroforético del veneno de serpiente de cascabel. [**Electrophoretic Study of Rattlesnake Venom**] *Rev. Inst. Malbrán.* Buenos Aires. 1954, v. 16, No. 3, 215–18, 1 fig. on pl.

The English summary appended to the paper is as follows:—

"1) The venom of *Crotalus terrificus terrificus* from Argentina has 3 electrophoretic components in evidence; at pH 8·6, two of these migrate to the anode and one to the cathode.

"The first component belongs to the basic protein (the *veratrizing factor* or M. Goncalves's *crotamine*).

"The second component would include the coagulant and anti-coagulant proteolytic enzymes.

"The third component would be related to the *neurotoxic* and *phosphatidasic factor* (Slotta's and Fraenkel Conrat's *crotoxine*).

"2) Crotamine is found in higher proportions than the 9·85% indicated by M. Goncalves. It is easily dyalized through cellophane, putting in evidence its low molecular weight and it is, undoubtedly, the cause of the veratrinic activity of the meridional rattle-snake's venom."

Barrio, A., Jr. Alergia al veneno de serpiente cascabel (*Crotalus terrificus terrificus*). [**Allergy to Rattlesnake Venom** (*Crotalus terrificus terrificus*)] *Rev. Inst. Malbrán.* Buenos Aires. 1954, v. 16, No. 3, 219–23. [11 refs.]

The English summary appended to the paper is as follows:—

"It is described a case of inhalatory allergie of the *Crotalus terrificus terrificus* powdered venom, acquired by the constant handling of dried poisons.

"The cutaneous test provokes skin reactions from solutions at 1/100,000, causing respiratory perturbations, as rhinitis, and bronchial spasms with solutions at 1/100."

Giuliani, V. Sulla resistenza del bozzolo del *Latrodectus tredecimguttatus* ad alcuni agenti fisici e chimici. [**The Resistance of the Cocoon of** *Latrodectus tredecimguttatus* **to some Physical and Chemical Agents**] *Nuovi Ann. d'Igiene e Microbiol.* 1955, May–June, v. 6, No. 3, 208–11. [11 refs.]

Latrodectism is a clinical condition which is due to a neurotoxic poison produced by certain spiders of the genus *Latrodectus*. The adult female spider dies off in winter after having laid its eggs in the autumn and wrapped them in up to 5 cocoons, each carrying some 50 to several hundred ova. On the resistance of these cocoons depends the survival of the species.

The author of this paper has exposed cocoons of *Latrodectus tredecimguttatus* to various physical and chemical agents, then warmed them for an hour at 38°C., opened them and counted the number of spiders that had survived the hazard.

Under running water at 16°C. the percentage of survivals was 100 after 2 days, 1·25 after 7 days and nil after 21 days. Floating in the same water, 63 per cent. were alive after 7 days. Under static water at 17°C. the survival percentage was 73 after 7, 24 after 10 and nil after 18 days.

One hundred per cent. survived refrigeration at 2°C. for 35 days, 38 per cent. after 90 days. At −13°C., 90 per cent. survived 7 days and none 21 days.

The vapour of hydrochloric acid destroyed the cocoons within 7 days, but 100 per cent. withstood the vapour of 10 per cent. formalin for 6 days and 35 per cent. were destroyed by this vapour after 19 days' exposure.

The survival of this species is thus seen to be well secured against the hazards of the elements and of other hostile factors. *J.Cauchi*

TOXOPLASMOSIS

Alexander, C. M. & Callister, J. W. **Toxoplasmosis of Newborn. Histologic Changes in Mother's Lymph Node with Presumptive Isolation of *Toxoplasma* from Mother's Lymph Node by Mouse Passage.** *Arch. Pathology.* 1955, Nov., v. 60, No. 5, 563–74, 13 figs. [18 refs.]

A case of congenital toxoplasmosis was recognized by finding typical toxoplasm pseudocysts in the neonatal brain tissue. Toxoplasms were also found in sections of cervical lymph nodes excised from the mother after the death of her infant. The diagnosis was confirmed by high dye-test titres and the organism was probably passaged into a mouse. These observations thus corroborate the earlier findings of Siim [this *Bulletin*, 1952, v. 49, 1158] of toxoplasm lymphadenitis. *I. A. B. Cathie*

Nathan, L. A. & Matheson, A. **Toxoplasmosis in Infants. Report of Two Cases.** *J. Pediatrics.* St. Louis. 1955, Nov., v. 47, No. 5, 640–44, 4 figs.

Morris, D., Levin, B. & France, N. E. **Congenital Toxoplasmosis. Diagnosis confirmed by Passage to Mouse.** *Lancet.* 1955, Dec. 3, 1172–4, 4 figs.

Petrovicky, O. & Vojtěchovsky, M. Klinický obraz získané toxoplasmosy s neurologického a psychiatrického hlediska. [**The Clinical Picture of Acquired Toxoplasmosis from the Neurological and Psychiatric Viewpoint**] *Časopis Lékařů Českých.* Prague. 1955, Aug. 26, v. 94, Nos. 34/35, 930–33.

The authors recognize 4 forms of acquired toxoplasmosis. (1) *Latent* and *pseudolatent*; there are probably many symptomless carriers among the population. (2) *Toxoplasmosis of pregnancy*, characterized by marked physical and mental fatigue during the 2nd half of pregnancy, probably due to toxotoxin. (3) *Overt toxoplasmosis*, due to primary infection or the inactivation of a latent infection by a debilitating disease such as tuberculosis. Two forms are recognized: (a) Subacute and chronic, with anorexia, abdominal pain, physical and mental fatigue, paraesthesiae, sweating, emotional lability and other signs often suggesting thyrotoxicosis, lasting for 2–8 weeks, and followed later by generalized glandular enlargement. A diagnosis of psychoneurosis, neurocirculatory asthenia, hysteria or atypical thyrotoxicosis may be made at this stage. A rapid loss of weight (20–25 kgm.) may follow, with enlargement of liver and spleen and leucopenia; chorioretinitis and focal neurological signs may develop after several months. (b) Acute form, with exanthem, bronchopneumonia, and rapid development of the symptoms of the subacute

form. (4) *Psychotic form.* Massive infections pursuing a rapid course may be accompanied by Korsakov's syndrome, delirium or visual hallucinations. A high percentage of positive skin reactions is commonly observed in schizophrenic patients. *D. J. Bauer*

Brutsaert, P. La toxoplasmose humaine et son diagnostic. [**Human Toxoplasmosis and its Diagnosis**] *Rev. Belge Path. et Méd. Expér.* 1951, Nov., v. 21, No. 3, 261–76. [39 refs.]

Petrovicky, O. Vlastní modifikace Frenkelova kutánního testu na toxoplasmosu na základě alergometrie. [**A New Modification of the Frenkel Toxoplasmin Skin Test based on Allergometric Studies**] *Časopis Lékařů Českých.* Prague. 1955, Aug. 26, v. 94, Nos. 34/35, 928–30, 2 figs. [23 refs.] English summary.

The author has developed a modification of the Frenkel skin test for the diagnosis of toxoplasmosis. Westphal antigen diluted 1 in 10 and 1 in 100 is injected intradermally in 0·1 cc. amounts, and similar injections of mixed human plasma are given as a control for non-specific reactions. If induration is absent after 24 hours the result is negative; erythema at least 20 × 20 mm. in area from the 1 in 10 dilution with induration of one-half this extent indicates a weak positive reaction, and erythema and induration at least 30 × 30 mm. in area at 24 hours and increased by one-half at 48 hours indicates a strongly positive reaction. The size of the reactions is measured by means of a plastic plate engraved with a millimetre grid; the reaction to the 1 in 100 dilution may be less (pleoergic), equal to (homodynamic) or greater than (pleoaesthetic) the reaction to the 1 in 10 dilution. Of 35 adults with proved toxoplasmosis 30 gave a pleoaesthetic, 3 a homodynamic and 2 a pleoergic reaction. A pleoaesthetic reaction was associated with infection of not more than 2 years' duration; the reaction later became homodynamic, then pleoergic and finally negative. A similar change was seen during treatment with pyrimethamine. *D. J. Bauer*

Petrovicky, O. & Kvapilík, J. Zkušenosti s toxoplasminovým testem ve Státní psychiatrické léčebně v Kroměříži na základě allergometrických studií. [**Experience with the Toxoplasmin Test in the State Psychiatric Hospital in Kroměříž based on Allergometric Studies**] *Časopis Lékařů Českých.* Prague. 1955, Aug. 26, v. 94, Nos. 34/35, 933–7.

The modified toxoplasmin skin test described in the preceding paper [above] was carried out on 118 patients (43 men, 75 women) in the State Mental Hospital in Kroměříž, Czechoslovakia. Positive results were obtained in 70 patients (59·32 per cent.), 51 of whom were women. The

positive reactors included 56 to 90 schizophrenics, 5 of 7 schizoid psychopaths and 9 of 21 psychoneurotics; 19 (27·1 per cent.) gave a pleoaesthetic reaction (indicating active infection), 40 (57·2 per cent.) a homodynamic, and 11 (15·7 per cent.) a pleoergic reaction. The patients in the pleoaesthetic group showed exaggeration of tendon reflexes, usually on the left side, with left facial palsy and extrapyramidal signs; the duration of infection was usually less than 1 year. The homodynamic group showed occasional anisocoria with reduced reaction to light, slight spastic paralysis of the legs and nystagmus; exaggerated reflexes were present in 90 per cent. and extrapyramidal syndrome in 70 per cent. of patients. Visual hallucinations were present in 92 per cent. of patients with a positive reaction, and auditory hallucinations in 41 (85 per cent.) of patients with a negative reaction. *D. J. Bauer*

Petrovicky, O. & Styblová, V. Pyrimethamin (Daraprim) v léčbě lidské toxoplasmosy. [**Pyrimethamine (Daraprim) in the Treatment of Human Toxoplasmosis**] *Časopis Lékařů Českých*. Prague. 1955, Aug. 26, v. 94, Nos. 34/35, 937–9. English summary (8 lines).

The authors describe the effect of pyrimethamine in the treatment of 13 patients who had suffered from toxoplasmosis for 6 months to 4 years; their symptoms included pyrexia, glandular enlargement, loss of weight, leucopenia, focal neurological signs, muscular atrophy, enlargement of liver and spleen and chorioretinitis. Treatment with 500–700 mgm. of pyrimethamine led to complete recovery, except in the case of 1 patient who was left with psychotic symptoms. One patient had a relapse 8 months later, but this was effectively suppressed by a further course of 400 mgm. *D. J. Bauer*

Eyles, D. E. & Coleman, Nell. **The Effect of Sulfadimetine, Sulfisoxazole, and Sulfapyrazine against Mouse Toxoplasmosis.** *Antibiotics & Chemotherapy*. New York. 1955, Oct., v. 5, No. 10, 525–8.

" Sulfadimetine and sulfisoxazole were ineffective against mouse toxoplasmosis except at very high dosages. Even when the drugs were administered at the rate of 2000 mg. per cent in the diet (approximately 4 Gm./Kg./day) half or less of the mice were cured. Comparatively, the median effective curative dosage for sulfadiazine was 98 mg. per cent in the diet.

" Sulfapyrazine, on the other hand, showed outstanding activity. The median effective dose was less than 31 mg. per cent in the diet, showing this drug to be superior to sulfadiazine on a gram for gram basis. This compound is the most active of the sulfonamides tested to date by this laboratory."

Eyles, D. E. & Coleman, Nell. **An Evaluation of the Curative Effects of Pyrimethamine and Sulfadiazine, Alone and in Combination, on Experimental Mouse Toxoplasmosis.** *Antibiotics & Chemotherapy.* New York. 1955, Oct., v. 5, No. 10, 529–39, 1 fig.

Mice were inoculated intraperitoneally with *Toxoplasma gondii*, the inoculum varying 10-fold from 2,000 to 2,000,000 organisms, and treated forthwith and for 14 days with pyrimethamine (Daraprim) or sulphadiazine incorporated in the diet. Five doses of the former were used, varying from 4 to 64 mgm. per cent. in the diet, and 6 of the latter (8–250 mgm. per cent.). Only the largest dose of pyrimethamine given to mice receiving the smallest inoculum gave 100 per cent. cure, although this drug in smaller doses cured 50 per cent. of those given the largest inoculum. Cure rates with sulphadiazine were generally lower.

When the two drugs were given together in the proportion of 22 per cent. pyrimethamine and 78 per cent. sulphadiazine, much smaller doses were effective: it is calculated that the effect was 6 times greater than that to be expected from simple additive action. The combination also eradicated the infection, as demonstrated by brain and liver passage, whereas the single drugs failed to do so. The combination was non-toxic. By treatment with it for different periods, a course lasting 10 days was found to be fully effective. It is mentioned that this combination has been successfully used in 2 cases of human toxoplasmosis.

L. P. Garrod

DERMATOLOGY AND FUNGUS DISEASES

Ellis, F. P., Hare, P. J. & Lind, A. R. **Transient Miliaria Profunda and Heat Incapacitation.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, Sept., v. 49, No. 5, 437–43, 3 figs. on 2 pls. & 2 text figs. [12 refs.]

A soldier, " T ", aged 22 developed headaches and signs of distress after working in a high temperature. Thirty minutes after doing moderate step-climbing exercise at a dry bulb temperature of 115°F. and wet bulb temperature of 90°F. with mean radiant temperature of 155°F. to which he had been exposed for 40 minutes he suddenly " collapsed ". Well defined " rice grain " miliarial swellings were seen on the whole body surface, except for the bathing-trunk area, but subsided within 10 minutes of his regaining the cooler atmosphere of an air-conditioned room. His symptoms of heat incapacitation passed away at the same time. Five other men completed a 4-hour task under the same conditions without showing signs of inefficiency or impending

incapacitation. Later all 6 subjects took part in a 2-hour " acclimatization " experiment performed at a dry bulb temperature of 100°F., wet bulb temperature 94°F., mean radiant temperature 100°F., mean air speed 150 ft./min. The work consisted of alternating 10-minute periods of step-climbing and sitting on a stepping stool.

The subject " T " sweated profusely and developed no miliarial lesions for half an hour. When the lesions appeared they were not very conspicuous but were clearly evident in an enlarged photograph. In a subsequent 4-hour experiment at a lower temperature " T " developed slight miliaria at the end of the 4-hour period but no unpleasant symptoms. No areas of anhidrotic skin could be discovered. When the subjects taking part in the test were examined it was found that " T " sweated more per kgm. of body weight than the average man, and his temperature and heart rate were higher than average after work.

Histological examination of a portion of skin from " T's " arm, removed 30 minutes after miliaria had been present, showed no significant abnormality. Although numerous sections were examined few dilated sweat ducts were seen, the course of the ducts was normal and there was no plugging of their orifices. *H. T. H. Wilson*

Negroni, P. & Daglio, C. A. N. Primer caso sudamericano de maduromicosis por *Madurella tabarkae*. [**First South American Case of Maduromycosis due to** *Madurella tabarkae*] *Rev. Inst. Malbrán.* Buenos Aires. 1954, v. 16, No. 2, 133–8, 1 fig. on pl. [30 refs.]

The English summary appended to the paper is as follows:—

" We report the first South American case of maduromycosis with black grains produced by *Madurella tabarkae*. The patient was a woman, 29 years old from Santiago del Estero (Argentina) and the mycetoma was localized in her left knee."

Vanbreuseghem, R. & Bernaerts, J. P. Production expérimentale de grains maduromycosiques par *Monosporium apiospermum* et *Allescheria boydii*. [**Experimental Production of Maduromycotic Grains by** *Monosporium apiospermum* **and** *Allescheria boydii*] *Ann. Soc. Belge de Méd. Trop.* 1955, Aug. 31, v. 35, No. 4, 451–6, 6 figs. on 3 pls. [12 refs.]

Hitherto, attempts to reproduce the characteristic parasitic fungal colony or " grain " of mycetoma by inoculation of the fungal culture into rodents have almost invariably resulted in complete failure. This is attributable, in some measure, to the usual absence of pathogenicity for the lower animals in the principal mycetoma fungi.

The present authors used 2 strains of *Monosporium apiospermum* and one of *Allescheria boydii*, recently isolated from cases of mycetoma in the

Congo [see Courtois *et al.*, this *Bulletin*, 1955, v. 52, 297], in attempts to reproduce the characteristic mycetoma grains in guineapigs and rats by intratesticular injection of living culture material containing conidia and, in the case of *A. boydii*, also the perithecia and ascospores. The animals died from various causes or were killed at intervals up to 7 months after inoculation.

In the case of 6 guineapigs inoculated with *M. apiospermum*, some showed merely testicular atrophy and others extensive granulomatous change in the organ, often with focal suppuration. Fungal mycelium present in the lesion appeared to be no longer viable and there was no indication of grains developing or of hyaline club formation. In one of 2 rats inoculated with this species there was a well-circumscribed testicular granuloma containing fungal elements not aggregated in grains but, nevertheless, showing a coating of hyaline, eosinophilic material which recalled the hyaline club formations often seen on mycotic grains. The fungus in these lesions was still viable.

In guineapigs inoculated with the culture of *A. boydii*, a granulomatous reaction developed in which mycelium and rudimentary perithecia were seen. From the surface of the perithecial structures short hyphae spread radially outward, forming a kind of corona; and these hyphae were covered with a double layer of eosinophilic, hyaline material, but there was no further indication of mycotic grain formation. In a single rat inoculated with *A. boydii*, however, a definitely mycetoma-like granuloma developed in the testis which showed characteristic grains of compacted mycelium with chlamydospore-like bodies towards the centre and hyaline club-like formations on the projecting ends of the peripheral filaments.

From the authors' observations, it is evident that the perfect stage, *A. boydii*, is more suitable for this kind of study than its conidial form, *M. apiospermum*, and that the rat is preferable to the guineapig. The recognition of 2 distinct layers in the film of hyaline material may indicate that both the fungus and the host play a part in its formation.

J. T. Duncan

TROPICAL OPHTHALMOLOGY

South Pacific Commission. Noumea, New Caledonia. **General Survey on Eye Diseases in Niue Island, American Samoa and Western Samoa** [Loschdorfer, J. J.]. With an Introduction on some Ophthalmological Conditions in the South Pacific Islands by G. Loison. *Technical Information Circular No. 13.* 1955, Aug., 30 mimeographed pp.

Mikuni, M. & Tsuchiya, A. **Studies on the Effect of Chloromycetin to Trachoma, especially on the Comparison of various Concentrations of Ointment.** *Acta Med. et Biologica.* Niigata. 1954, Dec., v. 2, No. 4, 755–71.

The authors made a mass treatment of school trachoma with various concentrations of chloromycetin [chloramphenicol] ointment applied once a day, varying from 0·1 per cent. to 5 per cent. ointment. In all, some 750 patients were treated.

As a result of their work it was concluded that the higher the concentration of chloromycetin in the ointment the better the results obtained, especially during the earlier weeks of administration. Even 0·5 per cent. ointment if applied continuously for a sufficiently long period and combined with surgical treatment gave satisfactory results.

The authors claim that the advantages of chloromycetin ointment are that even the high concentrations cause no irritation or other side-effects and also that the preparation is very stable. For practical use 1 or 2 per cent. concentration is recommended.

[This is an interesting and valuable paper and it is a pity that the effectiveness of the various concentrations of chloromycetin ointment have not been compared directly with other agents known to be effective against trachoma, notably aureomycin and terramycin [oxytetracycline].]

D. P. Choyce

Santos, B. Paula & Uchôa, P. P. M. A profilaxia do tracoma no Estado de São Paulo. [**Prevention of Trachoma in the State of São Paulo, Brazil**] *Ophthalmologia Ibero Americana.* 1954, v. 16, Nos. 1/2, 97–104, 1 map & 3 graphs.

MISCELLANEOUS DISEASES

Hassall, C. H. & Reyle, K. **The Toxicity of the Ackee (*Blighia sapida*) and its Relationship to the Vomiting Sickness of Jamaica.** *West Indian Med. J.* 1955, June, v. 4, No. 2, 83–90, 1 text fig. & 1 fig. on pl. [35 refs.]

Two polypeptides named hypoglycin A and B have been identified and extracted from an aqueous extract of the seeds of the ackee (*Blighia sapida*) [this *Bulletin*, 1955, v. 52, 691, 935]. Both hypoglycins are toxic to kittens, guineapigs and rats; both have striking hypoglycaemic properties and bring about gross reduction in liver glycogen.

Low blood sugar and liver glycogen values are characteristic of Jamaican vomiting sickness and the authors conclude that the unknown

toxic factor involved in this syndrome comes from ackee. Further study of the poisonous properties of ackee at various seasons and in relation to the nutritional status of the consumer is required. The fact that methods are available for assaying hypoglycin A, might make such investigation more practicable. *B. G. Maegraith*

Hill, K. R., Bras, G. & Clearkin, K. P. **Acute Toxic Hypoglycaemia occurring in the Vomiting Sickness of Jamaica. Morbid Anatomical Aspects.** *West Indian Med. J.* 1955, June, v. 4, No. 2, 91–104, 5 figs. on 2 pls. [61 refs.]

"Seven autopsies and one clinical case of a syndrome known as the Vomiting Sickness of Jamaica are described.

"In these cases hypoglycaemia was associated with fatty metamorphosis of the liver and other organs, tissue oedema, and alimentary lymphoid hyperplasia.

"During the acute phase biopsies and post mortem material show a depletion of liver glycogen. Evidence is presented that restoration can take place by intravenous glucose therapy.

"The mechanism of the changes is discussed and it is suggested that the defect may be one of deficient gluconeogenesis."

Feng, P. C. & Kean, E. A. **Influence of Diet on the Acute Toxicity of Hypoglycin-A in Rats.** *Brit. J. Nutrition.* 1955, v. 9, No. 4, 368–73, 1 fig. [12 refs.]

"1. Rats were fed either with (1) a high-carbohydrate, low-protein diet based on dietaries of poorer class Jamaicans, or with (2) diet (1) modified by the replacement of some carbohydrate with 10 per cent. protein, or with (3) a stock diet; the rats were tested for their susceptibility to hypoglycin-A, the toxic polypeptide from the fruit of *Blighia sapida*.

"2. Rats fed on the high-carbohydrate, low-protein diet showed a higher susceptibility than rats fed on the other two diets.

"3. It is suggested that the carbohydrate:protein ratio of the diet is a factor which influences the toxicity of hypoglycin-A."

[See this *Bulletin*, 1955, v. 52, 691; 935.]

Nigg, Clara, Heckly, R. J. & Colling, Margaret. **Toxin produced by *Mallcomyces pseudomallei*.** *Proc. Soc. Exper. Biol. & Med.* 1955, May, v. 89, No. 1, 17–20, 1 fig.

The authors, working with the organism *Malleomyces pseudomallei* [better known to many readers as *Bacillus whitmori*] and using strains isolated from fatal cases, have shown that in cultures in beef extract

broth containing 4 per cent. glycerin, toxic substances are elaborated which can be demonstrated in filtrates obtained after 8 to 12 days' incubation. These filtrates are lethal both to mice and hamsters and produce a local skin lesion in the guineapig, which is haemorrhagic, oedematous and erythematous. The haemorrhagic phenomenon develops within 3 hours and for this a thermolabile element in the filtrate is responsible. The others are also obtained with boiled filtrates.

No correlation between toxin production and the character of the bacterial colonies could be determined. *J. W. McLeod*

VAN BRAKEL, C. H. **Eosinophilia in the Tropics.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1955, Sept., v. 7, No. 3, 263–9. [14 refs.]

The author reports the simultaneous occurrence of Löffler's syndrome in a man and his wife but only in the latter were *Ascaris lumbricoides* subsequently found. [No treatment appears to have been given to the husband to exclude the possible successful development of a male adult worm.] In a third case eosinophilia appeared to have been due to a filarial worm. An adult filarial worm was reported in a lymphatic gland which did not show eosinophilic infiltration or the presence of larvae. The author suggests that in some patients reported as suffering from tropical eosinophilia [perhaps better called eosinophilic lung], the presence of *Strongyloides* may not have been excluded.

Frederick J. Wright

IKEJIANI, O. **Corticotropin (ACTH) in the Treatment of Onyalai.** *West African Med. J.* 1955, Sept., v. 4, No. 3, 136–43. [19 refs.]

Three cases of onyalai occurring in Nigeria are described. Two treated by corticotrophin (ACTH) rapidly improved. The bleeding time, which had been prolonged, rapidly returned to normal and the thrombocytopenia gave way to a normal platelet count. *Frederick J. Wright*

PETROVICKY, O. K otázce klíštové paralysy v ČSR. [**Tick Paralysis in Czechoslovakia**] *Časopis Lékařů Českých.* Prague. 1955, Aug. 26, v. 94, Nos. 34/35, 948–55, 1 map & 3 graphs. [68 refs.] German summary (9 lines).

In a field study of tick paralysis carried out among the inhabitants of a wooded rural area near Prague in the summer of 1955 tick bites were found on 206 (19·2 per cent.) of 1,070 children aged from 3–14 years; 9 children (4·35 per cent.) with tick bites had paralysis of lower motor neurone type of 1 or more nerves of the extremities, with little or no sensory disturbance. Erythema and oedema were seen around the bites.

No case of the generalized form of tick paralysis was observed among the 206 children, or among 216 adults living in the same area who had been bitten by ticks. *D. J. Bauer*

PARASITOLOGY: GENERAL

Simitch, T. & Petrovitch, Z. La faune des parasites intestinaux en Yougoslavie. I.—La faune des protozoaires intestinaux chez les enfants d'âge scolaire. [**Intestinal Parasites in Yugoslavia. I. Intestinal Protozoa in Schoolchildren**] *Arch. Inst. Pasteur d'Algérie*. 1955, June, v. 33, No. 2, 84–9, 1 map. [11 refs.]

The examination of the stools of 7,266 Yugoslavian schoolchildren from 133 localities, in which direct examination of faecal preparations and the cultural method were combined, revealed the following incidence of infection per cent. (the extreme figures denote range, the middle one indicates the average): *Entamoeba histolytica* (large race) 15·6, 30·6, 44·9; *E. histolytica* (small race = *E. hartmanni*) 0, 0·6, 2·6; *E. coli* 29·6, 38·2, 45·7; *Endolimax nana* 21·3, 36·1, 53·9; *Iodamoeba bütschlii* 26·3, 38·4, 52·5; *Giardia intestinalis* 10·8, 17·1, 26·2; *Trichomonas hominis* 3·0, 19·0, 46·4; *Tricercomonas intestinalis* [= *Enteromonas hominis*] 1·3, 16·6, 36·9; *Chilomastix mesnili* 1·5, 7·0, 22·5; *Balantidium coli* 0, 0·3, 1·8. *C. A. Hoare*

Pavlica, F. Pneumonia pneumocystica carinii u 5letého dítěte. [*Pneumocystis carinii* **Pneumonia in a 5-year-old Child**] *Časopis Lékařů Českých*. Prague. 1955, Aug. 26, v. 94, Nos. 34/35, 962–3. [16 refs.]

The author has observed 9 cases of pneumonia in young children caused by *Pneumocystis carinii*; 7 patients were aged 3 months, 1 was aged 4 months, and 1 case, which is described in detail, concerned a child aged 5 years. Physical development was normal up to the age of 4 years, but speech had not developed; 5 siblings were normal. On admission to hospital episodes of weeping and automatic movement were observed; the gait was ataxic, the left arm was held in flexion and the left leg was abducted and flexed at the knee. There were frequent tonic convulsions, particularly of the left arm and leg. Death occurred 11 days after admission. Autopsy revealed 2 pseudocysts at the base of the temporal lobes. The lungs were airless, grey or violet in colour, and with a marbled appearance on section. The spleen was enlarged and haemorrhagic; the heart and kidneys showed parenchymatous degeneration and

the liver showed fatty infiltration. Microscopical examination of sections of the lungs showed the typical appearance of *Pneumocystis* pneumonia.

D. J. Bauer

Lysek, H. Vyšetřování geohelmintos s hlediska hygienicko-epidemiologického ve Šternberku na Moravě. [**Investigation of Geohelminthiases from a Hygienic and Epidemiological Standpoint in Šternberk in Moravia**] *Českoslov. Hyg., Epidemiol., Mikrobiol., Imunol.* Prague. 1955, v. 4, No. 6, 317–22. [20 refs.] English summary (6 lines).

Determinations have been made of the content of helminth eggs in samples of soil taken from different parts of the town of Šternberk in Moravia (Czechoslovakia). The town has no sewerage, and hygienic conditions are bad; domestic sewage is allowed to accumulate in sumps filled to overflowing, the contents of which are carried off at irregular intervals and poured on the ground behind the local sports pavilion and slaughterhouse. Samples of earth to a total weight of 200 gm. were taken from an area of 50 square metres, and eggs were concentrated by alkali treatment and centrifugation. Eggs of the following worms were found in samples from market gardens, farms and other places; *Ascaris lumbricoides* and *A. suum*, 10–4,010 eggs per kgm. of soil; *Hymenolepis diminuta*, abundant; *Enterobius vermicularis*, 5–10; *Toxascaris leonina*, 5–400; *Toxocara mystax*, 190 in 1 sample only; *Trichuris* sp., 95–1,875 eggs per kgm. of soil. The incidence of enterobiasis in 722 children investigated was 54 per cent., and 55 per cent. and 11 per cent. of 381 children were infested with *Ascaris* and *Trichuris* respectively.

D. J. Bauer

Cuckler, A. C., Kupferberg, A. B. & Millman, N. **Chemotherapeutic and Tolerance Studies on Amino-Nitro-Thiazoles.** *Antibiotics & Chemotherapy.* New York. 1955, Oct., v. 5, No. 10, 540–50, 1 fig. [16 refs.]

" 1. A high order of in vitro and in vivo antitrichomonas activity has been demonstrated for aminitrozole (2-acetylamino-5-nitrothiazole). This compound was shown to have therapeutic effect in vaginal trichomoniasis in monkeys and experimental trichomoniasis in mice when administered orally.

" 2. Aminitrozole was the most active antitrichomonas compound in a series of 2-substituted amino-5-nitrothiazoles.

" 3. Antiamebic activity has been shown for 2-amino-5-nitrothiazole and certain derivatives, including aminitrozole.

" 4. Definite antischistosome activity has been noted for aminitrozole, while 2-amino-5-nitrothiazole is completely ineffective. No other anthelmintic activity has been noted.

"5. Aminitrozole has been relatively well tolerated by 6 species of animals for extended periods of administration by various routes. Dosages have been recommended for initial clinical appraisal of this compound in human vaginal trichomoniasis."

See also p. 356, Demaeyer *et al.*, Enquête parasitologique et variations de la protéinémie en fonction de l'altitude chez les indigènes de la région de Katana-Lwiro. [**Examination for Parasites and Variations in Serum Protein as Functions of Altitude in Africans of the Katana-Lwiro Area**]

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

Gressitt, J. L.; Esaki, T.; Bryan, E. H., Jr. **Insects of Micronesia. Vol. 1. Introduction** [Gressitt]. pp. viii + 257, 49 figs. & 22 maps. [9 pp. refs.] 1954. Honolulu: Bishop Mus. **Vol. 2. Bibliography** [Esaki, Bryan & Gressitt]. pp. ii + 68, 1 map. 1955.

Packchanian, A. **The Effect of Simulated Altitude on certain Insect Eggs.** *Texas Reports on Biol. & Med.* 1955, v. 13, No. 3, 454–69, 1 fig. [20 refs.]

With equipment described elsewhere the viability was assessed of the eggs of *Aëdes aegypti*, *Anopheles quadrimaculatus*, *Culex fatigans*, *Pediculus humanus corporis* and *Rhodnius prolixus* and of the pupae of *Musca domestica* and *Xenopsylla cheopis* after various periods of exposure at different conditions of the kind to be expected at various altitudes. The observations are intended to indicate the chances of survival of eggs and pupae of the species tested if adherent to the outer surface of aircraft and liable to be carried from place to place by this means. [One might doubt the probability of some of these objects occurring on such surfaces; the results are, however, intrinsically of interest.] There was no survival after 15 minutes at conditions representative of 22,500 feet above sea-level (−30°C. and 314 mm. Hg absolute pressure) or higher; at lower simulated altitudes lethal exposure times varied from species to species. It is noted that the experiments fail to allow for the ameliorating effects which friction heat on an aircraft surface may cause. The conclusion is

put forward that 15–30 minutes' flight at 30,000 feet might be a desirable procedure for the destruction of insects, or their eggs, lodged on the outer surfaces of an aircraft. *D. S. Bertram*

I. Oka, H. **A Biochemical Study on the Growth of the Mosquito, with special reference to the Changes in Protein, Fat and Carbohydrate Contents during its Development.** Reprinted from *Bull. Yamaguchi Med. School.* 1955, v. 2, No. 3, 115–35, 4 figs.

II. ————. **A Morphological Study on the Growth of the Mosquito Larvae.** Reprinted from *ibid.*, 137–47, 8 figs. [13 refs.]

III. ————. **The Vicissitude of Weight and Length during Mosquito's Growth. A Study on** *Culex pipiens* **var.** *pallens.* Reprinted from *ibid.*, 149–53, 2 figs.

I. The mosquitoes used in this investigation were *Culex pipiens pallens* (eggs, larvae, pupae, adults) and *Anopheles hyrcanus sinensis* (adults only). The laboratory procedures are described in detail and the resulting data are presented in tables and graphs showing changes in the nitrogen, fat and carbohydrate content during growth.

II. The mosquitoes used in this study were *Culex pipiens pallens*, *C. tritaeniorhynchus* and *Anopheles hyrcanus sinensis.*

Morphological characters which are considered useful in determining the larval instars are given as: head diameter, a universal criterion; the base-to-hair distance on the antenna and the length of the siphon for the genus *Culex*; and the branching of hair No. 6 on the 3rd abdominal segment for the genus *Anopheles.*

III. In the 2 previous papers mosquito growth was examined from the separate standpoints of the biochemist and the morphologist. In this paper the author compares the growth factors of weight and length as recorded for *Culex pipiens pallens* and concludes that the growth formula in both egg and larval stages of mosquitoes is similar to that observed in the higher animals but the change from pupa to adult is not growth but metamorphosis. *H. S. Leeson*

Clements, A. N. **The Sources of Energy for Flight in Mosquitoes.** *J. Exper. Biol.* 1955, Sept., v. 32, No. 3, 547–54. [15 refs.]

Reserve deposits of fat and glycogen are known to serve as sources of energy for flight in various insects. Mosquitoes have 3 possible sources of flight energy: in reserves carried over from the larval stage, in meals of nectar and in meals of blood.

Experiments are described in this paper which were designed to indicate the extent to which reserves and ingested blood may provide

energy for flight in mosquitoes. The insects were flown on a "flight mill" which measured the distances flown [this *Bulletin*, 1954, v. 51, 1198].

Glycogen disappeared from the fat body during the flight of *Culex pipiens* form *berbericus* but no change was observed in the fat deposits. It is therefore inferred that glycogen, not fat, is the immediate source of flight energy and the many accounts of mosquitoes of both sexes feeding on nectar have shown this to be a source of energy. The results of these experiments also indicate that the digestive products of blood meals provide flight energy and the reserves of unfed females provide enough energy for flights of considerable distances. *H. S. Leeson*

Déduit, Y. & Callot, J. Études sur la ponte par autogenèse des Culicides. I.—Données numériques sur l'acte de ponte chez la femelle vierge isolée de *Culex pipiens autogenicus* Roubaud. [**Study of Autogenetic Oviposition of Mosquitoes. I. Statistical Data relating to Oviposition in the Virgin Female** *Culex pipiens autogenicus* (*molestus*)] *C.R. Soc. Biol.* 1955, May, v. 149, Nos. 9/10, 1003–6, 2 figs.

There is a relationship between the size of *Culex pipiens autogenicus* [= *molestus*], expressed by the length of the wing, and the capacity to develop eggs by autogenesis. The longer the wing, the greater the number of females with eggs. The average number of eggs per oviposition also increases with wing length, but the number of ovipositions made by the virgin female is not related. *G. Crisp*

Colless, D. H. **Notes on the Culicine Mosquitoes of Singapore. I.—Three New Species of** *Culex* **(Diptera, Culicidae) and a Redescription of** *Culex hutchinsoni* **Barraud.** *Ann. Trop. Med. & Parasit.* 1955, Oct., v. 49, No. 3, 311–19, 4 figs.

The 3 new species are *Culex pseudosinensis*, *C. geminus*, and *C. propinquus*. *C. pseudosinensis* is closely related to *C. bitaeniorhynchus* and has been found in nature in the aquatic stage only in a large pool just inside the jungle. Adults are described from bred material. *C. geminus* differs from *C. pseudosinensis* in male terminalia and the larval mentum; it occurred as larvae in the same large pool. The females of both species are hardly distinguishable from *C. sinensis*. *C. propinquus*, bred out from 3 pupae in a well, is known only as the female. It resembles *C. mimulus*.

C. hutchinsoni, a species here redescribed in the female, male, and larva stage, is widely distributed but not very common. The female may be mistaken for *C. fatigans* when found indoors, and its breeding habits

are similar. The larva, however, has a distinctive spine on the siphon, found in no other oriental *Culex*. *D. S. Bertram*

Murphy, S. **An Account of an Aerial Spraying Operation at Lake Nakuru.** *East African Med. J.* 1955, Oct., v. 32, No. 10, 395–9.

Lake Nakuru, Kenya, is an alkaline lake of 100 to 150 acres with a large fringe of sedge (*Cyperus laevigatus*). Very large numbers of the nuisance mosquitoes, *Culex mirificus* and *Aëdes natronius*, breed in the moderately dense portions of this sedge. To abate the nuisance, the lake was sprayed from the air with 2 gallons per acre of a dieldrin emulsion, giving 4 oz. active principle per acre. Half the area was sprayed twice, giving a double dose.

The effects of treatment were noted by general inspections every 3–4 days, as time did not allow extensive checking. These observations showed that the insecticide remained effective at the breeding ground for 25 to 32 days. The numbers of mosquitoes caught at catching stations in a nearby town did not decline until about 3 weeks after the spraying (presumably because of adults in the surrounding bush); but after that there was evident relief for a month or so. *J. R. Busvine*

Gahan, J. B. & Mulhern, T. D. **Field Studies with Water-Soluble Insecticides for the Control of Mosquito Larvae in California Pastures.** *Mosquito News.* 1955, Sept., v. 15, No. 3, 139–43, 1 fig.

Many grassland farms in California need regular irrigation at 10–14-day intervals. The standing water provides breeding ground for vast hordes of nuisance mosquitoes (over 90 per cent. *Aëdes nigromaculis*). The flooding is done in long strips 25–50 feet wide, which facilitated field trials of 2 water-soluble insecticides of phosphoric acid type. These were added, at different rates, to the water flowing into the strips of field and the effects were judged by dipping for larvae next day (in comparison with untreated plots). Other tests were made by adding larvae to water taken at different points and noting their subsequent mortality.

The compounds tested were Bayer L 13/59 (O,O-dimethyl-2,2,2-trichloro-1-hydroxyethylphosphonate) and Shell OS 2046 (dimethyl 1-carbomethoxy-1-propen-2-yl phosphate). Both were completely effective at rates of 1 p.p.m. and above. A test of Bayer L 13/59 at 0.1 p.p.m. gave only 74 per cent. reduction of larvae. The trials showed that the insecticides remained larvicidal in water travelling as much as half a mile, but there was very little residual action (about 2 days). *J. R. Busvine*

Dethier, V. G. **The Tarsal Chemoreceptors of the Housefly.** *Proc. Roy. Entom. Soc. of London.* Ser. A. 1955, Sept. 30, Pts. 7/9, 87–90.

Nakajyo, E. [**Some Histological Observations on Fatal Flies (*Musca domestica* Linné) contacted with γ-BHC**] *J. Osaka City Med. Center.* 1955, Jan., v. 4, No. 1, 55–8, 97, 3 figs. [In Japanese.]

The English summary appended to the paper is as follows:—

"The cytological and histological variations as to the nervous bulb, cells of muscle, and gastrointestinal tract of Musca domestica Linné contacted with γ-BHC, were observed continuously from the beginning of the first reaction of insecticide covering the paralytic period to the time of death.

"Following the application of γ-BHC the tissue and cells above mentioned, showed in the nucleus vacuolar formation, pyknosis, deformation, and swelling; in the protoplasm vacuolarization, homogenization, etc.

"These findings were observed as soon as γ-BHC was employed, slightly at first, most markedly at the fatal stage and then gradually fading in 24 hours following death."

Lin, S. & Richards, A. G. **Oxygen Consumption of Resistant and Susceptible House Flies.** *J. Econom. Entom.* 1955, Oct., v. 48, No. 5, 627–8, 1 fig.

We have to conclude that our measurements fail to show any significant difference in oxygen consumption for resting individuals of these three strains of house flies."

Milani, R. Comportamento ereditario dei caratteri *knock-down resistance* (*kdr*) e *plexus* (*plx*) in *Musca domestica*. L. (Nota preliminare). [**Inheritance of the Characters Knock-Down Resistance (kdr) and Plexus (plx) of** *Musca domestica* L. (Preliminary Note).] *Rendiconti Istituto Superiore di Sanità.* Rome. 1955, v. 18, Pt. 10, 889–97. English summary.

See this *Bulletin*, 1955, v. 52, 1025.

I. Keller, J. C., Wilson, H. G. & Smith, C. N. **Poison Baits for the Control of Blow Flies and House Flies.** *J. Econom. Entom.* 1955, Oct., v. 48, No. 5, 563–5

II. Kilpatrick, J. W. & Schoof, H. F. **DDVP as a Toxicant in Poison Baits for House Fly Control.** *J. Econom. Entom.* 1955, Oct., v. 48, No. 5, 623–4.

These papers describe further tests of poison baits containing insecticides of phosphoric acid type. [For earlier trials, see this *Bulletin*, 1954, v. 51, 851, 1202 (*bis*); 1955, v. 52, 223.]

I. Some rather heterogeneous field trials showed that daily use of poison baits can give good reduction of house-flies and blowflies in such places as slaughter houses and garbage dumps. The insecticides, which were mainly used at 1 per cent. with malt or molasses as attractants, were sometimes used in dry form, sometimes as liquids. Comparisons are difficult owing to the variability of the data presented but none of the following compounds appears to be outstandingly better than the others: "Shell OS 2046" (1—carbomethoxy—1—propen-z-yl dimethyl phosphate); "Shell OS 1808" (diethyl analogue of above); "Bayer 13/59"; chlorthion; malathion.

II. The new organophosphorus insecticide DDVP (O, O-dimethyl 2, 2-dichlorovinyl phosphate) has been claimed to be as insecticidal as parathion against house-flies but only one-sixth as toxic to rats. (Mattson *et al.*, *J. Agr. & Food Chem.*, 1955, v. 3, 319.) Some field trials of this compound as a poison bait at 0·1 per cent. in 10 per cent. sugar solution gave excellent control of house-flies in cattle barns for 2 days. The results appear better than those with other phosphorous insecticide baits.

J. R. Busvine

Keller, J. C. **Poison Bait for the Control of House Flies on Military Reservations.** *J. Econom. Entom.* 1955, Oct., v. 48, No. 5, 528–9.

"At the Air Force Base at Pine Castle, Fla., four daily applications of 400 grams of 2 per cent Chlorthion sugar bait gave excellent control of flies at mess No. 1. After 3 days a second series of four treatments gave similar results. Ten days later one treatment of 200 grams gave satisfactory control. At mess No. 2 a similar treatment gave excellent control.

"At the Mountain Training Camp, Dahlonega, Ga., fair control of flies was obtained in the kitchen, class and recreation tent, garbage rack, and latrine 4 hours after the first treatment with 100 or 200 grams of 1 per cent Chlorthion sugar bait, and excellent control in all locations except the latrine after 24 hours. Control was excellent 4 and 24 hours after the second treatment.

"At Camp Stewart, Ga., excellent control was obtained at garbage racks with one treatment of 200 grams of 1 per cent Chlorthion sugar bait. Excellent control was also obtained inside three mess halls with four similar treatments, and good control in one mess with six treatments. Excellent control was obtained in two messes with treatments applied just before they closed in the evening."

Chereshnev, N. A. [**Skin Myiases in Man caused by Larvae of the First Instar of Stomach Botflies (Fam. Gastrophilidae).**] *Dokl. Akad. Nauk SSSR* (n.s.). Moscow. 1954, v. 99, No. 4, 661–4. [In Russian.]

MACKERRAS, I. M. **The Classification and Distribution of Tabanidae (Diptera). II. History: Morphology: Classification: Subfamily Pangoniinae.** *Australian J. Zool.* 1955, Oct., v. 3, No. 3, 439–511, 39 figs. [Numerous refs.]

SCHULZE, P. Über Ausscheidungsvorgänge und Ablagerung von Stoffwechselprodukten bei den Zecken. [**Excretion Processes and Storage of Metabolic Products by Ticks**] *Ztschr. f. Parasitenk.* 1955, v. 17, No. 3, 217–36, 11 figs. [Numerous refs.]

DIAS, J. A. T. S. **Key to the Adult Ixodidae of the Genus Haemaphysalis C. L. Koch, 1844 of Ethiopian Africa.** *Anais Inst. Med. Trop.* Lisbon. 1955, Sept., v. 12, No. 3, 463–75.

LAVOIPIERRE, M. M. J. **A Description of a New Genus of Sarcoptiform Mites and of Three New Species of Acarina Parasitic on Primates in the British Cameroons.** *Ann. Trop. Med. & Parasit.* 1955, Oct., v. 49, No. 3, 299–307, 8 figs. [11 refs.]

BUTTS, W. L. & DAVIDSON, R. H. **The Toxicity of Five Organic Insecticides to Resistant and Non-Resistant Strains of** *Blattella germanica*. *J. Econom. Entom.* 1955, Oct., v. 48, No. 5, 572–4, 1 fig.

"A strain of chlordane resistant German cockroaches, *Blattella germanica* (L.), and a strain of normal individuals of the same species were reared under similar conditions. Individuals of both strains were used in the evaluation of five insecticidal compounds: aldrin, chlordane, dieldrin, heptachlor and lindane. The insecticides were introduced into the hemocoele by a microinjection apparatus, using cockroaches of a specific weight range. The results with normal cockroaches show the compounds can be listed in order of descending toxicity as follows: lindane, dieldrin, heptachlor, aldrin, chlordane: with resistant cockroaches, lindane, dieldrin, aldrin, heptachlor, chlordane. The resistant strain of cockroaches showed some degree of resistance to all the compounds, but the highest degree of resistance was exhibited in relation to heptachlor."

HUSAIN, S. & FISK, F. W. **Comparison of Certain Organic Insecticides as Sprays or Baits against** *Blatella germanica*. *J. Econom. Entom.* 1955, Oct., v. 48, No. 5, 576–8, 2 figs.

"Adult females of *Blattella germanica* (L.) were used to evaluate seven organic insecticides applied as water-dispersed sprays or offered as baits.

The sprays were directed onto the test insects confined in petri dishes. In the bait tests, insecticides were diluted into a measured quantity of water and mixed into the carrier, ground dog food, keeping the amounts of water and carrier constant. The baits were offered in salve tins covered with 8-mesh hardware cloth through which the cockroaches could extend their mouthparts to feed.

" Seventy-two hour mortality data were plotted on logarithmic-probability paper from which the LD_{50} and LD_{95} values are reported as per cent actual toxicant in the spray or bait.

" Aldrin both as spray and bait appeared to be the most toxic insecticide of those tested. The ranking of the chemicals as to relative toxicity was different for each of the two methods of testing. For instance, heptachlor was more effective in a bait than when sprayed, while isodrin was much less effective in a bait. Possible reasons for isodrin's apparent lessened attractiveness as a bait are discussed."

Ramanujachari, G. & Alwar, V. S. **The Role of Domestic Pigs in the Life Cycle of *Linguatula serrata* Froehlich, 1779 (Tongue Worm).** Reprinted from *Indian Vet. J.* 1954, May, v. 30, No. 6, 515–16.

Knipe, F. W. **Characteristics of Nozzle Tips used on Mosquito-Control Equipment. A Measurement of Materials lost through Rebound and Atomization.** *Bull. World Health Organization.* Geneva. 1955, v. 13, No. 2, 337–44.

When walls are sprayed to give residual deposits of insecticide, part of the liquid is lost by two causes:— (i) rebound of particles from the wall, (ii) loss of finely atomized air-borne particles which never hit the wall. The author has studied these losses in tests with 2 nozzles which were mounted in an apparatus spraying horizontally under controlled conditions. The 2 nozzles were of different sizes and were tested at different pressures. Their outputs depended on pressure and it was noted that the fine nozzle at 40 pounds per square inch (p.s.i.) or 2·68 atmospheres, ejected the same amount of liquid (water) as the coarse nozzle at 10 p.s.i. (0·67 atm.). This amount was about the optimum recommended by the WHO Expert Committee on Insecticides.

The nozzles were made to spray against a vertical sheet of galvanized iron, or the same surface covered by one or two thicknesses of cloth. The cloth increased the absorptive capacity of the surface, although it was saturated before each trial began.

The amount lost by rebound and atomization was calculated from the difference in the amount expelled and that acquired by the sprayed surface. It was found that the percentage loss ranged from 9 per cent.

with low output and most absorptive surface, up to 59 per cent. with highest output and non-absorptive surface. The loss was similar for the 2 nozzles working at the same output (but different pressures) with all 3 surfaces. In some tests the rebounding droplets were caught by mosquito netting and enabled a calculation of the relative losses by rebounding and atomization. These appeared to be about equal.

J. R. Busvine

Dowling, M. A. C. **Porton Low-Pressure Aerosol Dispenser. Report on a Series of Experiments to confirm the Efficiency of the Dispenser against Different Test Insects.** *J. Roy. Army Med. Corps.* 1955, Oct., v. 101, No. 4, 335–42, 6 figs. on 2 pls. & 1 graph.

[This paper gives no information about the design of the dispenser or its contents. From examination of a sample, it appears that the formula used is as follows:— pyrethrum extract (6·5 per cent. pyrethrins) 6 per cent.; DDT 3 per cent.; lubricating oil 2 per cent.; Cyclohexanone 7 per cent.; propellent 82 per cent.]

Tests of the Porton aerosol dispenser were made in a 1,250 cu. ft. room. Three types of test insects were used; *Anopheles stephensi*, *Aëdes aegypti* and *Musca domestica*. All species were used as 2–5-day-old adults and the mosquitoes were females fed on blood. These insects were exposed in 4-inch cube cages of mosquito netting. Eight cages were included in each test, each containing 8 or 10 insects. The cages were placed at various levels in different parts of the room and two untreated control cages were kept outside the room.

After the cages were placed in position, the aerosol dispenser was operated for 10 seconds in each test (8 seconds per 1000 cu. ft.). Three experiments were done with each test insect, in which they were left for 10, 5 or 2½ minutes respectively, in the mist produced by the dispenser. Knock-down and kill was noted at the end of the treatment and at different times up to 24 hours. Results showed that 5 minutes " contact time " gave 100 per cent. knockdown at ½–1 hour, with no recovery. The shorter exposure time of 2½ minutes allowed some recoveries of mosquitoes at 24 hours and gave virtually no kill of flies. However the 5-minute time is considered to have a safe margin because in all these tests the insects were protected by the mosquito netting which also prevented them from flying and acquiring a heavy dose.

J. R. Busvine

NOTICE

ROSS INSTITUTE OF TROPICAL HYGIENE

Lay Course in Tropical Hygiene

To be held from 16th to 20th July, 1956

The annual course for laymen will be held by the Ross Institute this year from Monday, 16th July to Friday, 20th July inclusive.

The course is as far as possible arranged so that morning sessions provide a continuous course on malaria and its control, and in the afternoons other tropical diseases and problems are dealt with, such as hookworm, bilharzia, nutrition, housing and sanitation, and protection against heat.

It is intended for such people as estate and mine managers and their assistants, missionaries and all those whose work in the tropics makes them responsible for the health and welfare of others. Senior men will find the course of particular value owing to the many developments and great advances in knowledge of these subjects which have taken place in recent years.

There is no fee for the course.

It would be appreciated if agencies and firms would inform their managers and assistants that this course is being organised and encourage and assist them to attend. The names of those proposing to attend should be sent as soon as possible to the Organising Secretary, but amendments and additions may be made at any time up to the date of commencement of the course.

It would be helpful if intending students would state their occupation and the country or district to which they are going. This will enable the organisers to arrange the programme according to requirements.

Further information on the detailed arrangements will be sent to those who have enrolled about a month prior to the date of the course.

Further copies of this notice will be sent on request to:—L. G. PONSFORD, *Organising Secretary*, Ross Institute of Tropical Hygiene, London School of Hygiene and Tropical Medicine, Keppel Street (Gower Street), London, W.C.1. *Telephone*:—MUSeum 3041–4. LANgham 7621–5.

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